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VIEWS, NEWS AND INTERVIEWS.

A well known naval officer, now stationed at Key West, Fla., writes to the ELECTRICAL REVIEW as follows: "The 'Bache' brought over to the quarantine hospital here a number of the survivors of the 'Maine.' One of these wounded jackies, when asked to tell what he knew of the frightful explosion, said: 'Well, sir, I was a-corkin' it off in me hammick, sir, when I hears a hell of a noise. Then, sir, the nurse says, "Sit up an' take this." That's all I know, sir.'"

Ex-Senator Calvin S. Brice is said to be interested in a scheme to run an electric road up the Kaw Valley, from Kansas City to Lawrence and Topeka, a distance of fully 60 miles. According to an exchange, it is proposed to change the valley from a continuous cornfield, yielding annually from $10 to $20 per acre, to a vegetable and fruit-growing region, which will return from $200 to $500 per acre per year. By means of the proposed road these products can be delivered into the Kansas City market in from 15 to 50 minutes from the time they are gathered. By cutting the present immense tracts of land, some of them over 2,000 acres in extent, into five, 10 and 20-acre tracts, it is expected that a great increase to the population of the Kaw Valley will follow, and that it will become the greatest garden in the world.

Some time ago the Bullock Electric Manufacturing Company, of Cincinnati, secured a contract for supplying the Brooklyn Navy Yard with a dozen electric motors of large capacity for operating drills and other machinery used in the construction departments of the yard. Last week the company received telegrams ordering work on the motors hastened to completion with all possible dispatch.

It is unofficially stated that the big snowstorm of a month ago cost the New England Telephone and Telegraph Company in the neighborhood of $100,000, exclusive of loss of business. The company had to replace 2,000 poles, which cost on an average about $15 each. There was a great deal of wire that was so tangled as to be useless. The cost of labor, however, was the largest item. The storm was almost wholly confined to the territory of the New England company. The Southern New England company was only damaged to the extent of about $5,000.

A Boston paper says that a four-inch circular saw for the amputation of limbs is being installed at the Emergency Hospital in that city. An electric motor will furnish the power to run the device. The saw will be mounted on a flexible shaft like that which a dentist uses, only larger. The bearings, in which runs the saw arbor, are attached to a handle by which the surgeon is able to direct the saw at any angle. Dr. Galvin and his assistants will be able to save considerable time by the use of this appliance. Not only does the saw cut much faster than a hand tool, but the heat of its rapid cutting sears the flesh and blood vessels, and the healing processes of nature are advanced to a stage which by the old method is reached only after an hour or two.

The Maryland Legislature is going to experiment with the question of street-car fares. A bill has been introduced in that body providing for three-cent fares when seats in street cars are full. The bill provides that when the car is full and seats are all occupied passengers who are forced to stand are to be charged but three cents.

A syndicate of New York and Saratoga capitalists is reported to have purchased, at a cost of $20,000, the land in the vicinity of Hell Gate Rapids on the upper Hudson, about seven miles above Glens Falls, N. Y. The intention is to use the great water-power at that point as the motive power for an electrical plant. A dam and power-house are to be erected, and with the electricity generated therein a railroad to be known as the Saratoga Northern, running between Saratoga Springs and South Glens Falls, is to be operated. This road is to have branches to intermediate points and also to Glens Falls, Sandy Hill and Fort Edward.

An exchange says that rapid-test soundings were required in some work on a railway line between Paris and Havre, where the cast-iron viaduct of Bezons was replaced by an arch bridge alongside. The old foundations for six channel piers were removed to the bottom of the river. It was required that the river bed should be carefully leveled. After it had been dredged the bottom was explored by means of a horizontal bar of iron about 20 feet long, which was suspended at each end from a framework uniting two flat boats in catamaran fashion. This beam was lowered close to the bottom, and the boats were gradually moved along in the direction transverse to the length of the bar. When the scraper encountered no irregularity, the suspending chains hung vertically, but as soon as either end was deflected by contact with any obstruction an electric circuit was closed, which caused an alarm to be rung. The boat was stopped and the obstruction located by means of sounding poles. In this way small stones, down to a diameter of four inches, were easily located, and the bed of the river was leveled to within that amount of irregularity. This method proved rapid and successful.

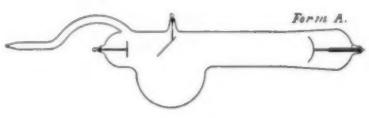


FIG. 1.—SMALL SIZE BOWDOIN X RAY TUBE.

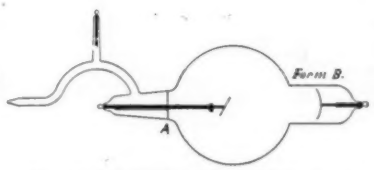


FIG. 2.—BOWDOIN X-RAY TUBE WITH REGULATED VACUUM.

REMARKS UPON X-RAY TUBES.

A REVIEW OF THE EXPERIMENTS THAT HAVE BEEN MADE IN THIS INTERESTING FIELD.

BY C. C. HUTCHINS.*

I have been much interested in reading the Roentgen-ray notes, by Mr. William Rollins, in the ELECTRICAL REVIEW, and can but admire the patience and intelligence with which he is working upon this interesting subject, and all must feel to congratulate him upon the valuable results that he has obtained.

I, however, may be allowed to remark upon a tendency which he exhibits to confound what is strictly scientific fact with what is more matter of opinion or working hypothesis. Thus, he speaks of "that remarkable fact of Mr. Tesla's that molecules of the residual gases went out through the glass walls."

I believe there are other and more probable ways of explaining the rise in vacuum of a Crookes tube.

Again, Mr. Rollins asserts that tubes give X rays of different wave lengths, depending upon the degree of exhaustion and potential employed. Have such differences in wave length ever been measured? Can he refer us to any work showing that any such exist? That the phenomena observed in tubes of various degrees of exhaustion do admit of such an explanation no one would deny; but that such is the correct explanation, I fear, we can not affirm, in the light of present knowledge.

Under Article XXII we find: "Oxygen was chosen on account of its reasonably high molecular weight, and because I had reason to believe these molecules would be easier than some others to break under electric stress into electro-negative and positive groups, a matter of some importance, because Roentgen light and smashed molecules go together." From the first part of this quotation (as also appears in another place in his discussion), it is apparent that Mr. Rollins believes that the heavier the molecules with which the tubes are loaded, the more

* Professor of Physics at Bowdoin College.

the energy that will be available in the cathodic bombardment. We can assert that this is not so, for it is one of the fundamental facts of a gas that the average kinetic energy of its molecules is the same as for any other gas or mixture of gases under the same conditions.

In regard to the second part of the quotation, that Roentgen light and smashed molecules go together, I fear we shall have to write "Not proven." Ordinary gases do, it is true, conduct by electrolysis, but that the same *must* hold true under the peculiar conditions of the Crookes vacuum has, I believe, never been shown.

However we may feel inclined to criticise Mr. Rollins's purely scientific or theoretical conclusions, there is no doubt but that he is going at the problem of producing the best tube for X-ray work in the best manner possible—by experiment and observation.

In this connection it may not be unprofitable to give some account of a series of experiments conducted by Prof. F. C. Robinson and myself, with a view to finding the best and most efficient form of X-ray tube.

We were fortunate in being able to do this, in that we were both practical glass-blowers, capable of making any form of tube that our ingenuity could suggest, and in having at hand the most perfect form of mercury pumps and other accessories.

We went to work as soon as the earliest newspaper accounts appeared, and were making tubes with reflectors before any account of the invention had appeared in America.

We were led to the use of the reflector in this way: Finding, as every one has found, that when the cathode discharge is thrown against the glass the glass is quickly melted, we sought to protect this spot with an aluminum screen. This screen was found to be a source of X rays; and when other metals, such as copper, iron, etc., were substituted for the aluminum, the resulting effect was much increased, and was strongest when platinum was used for the screen, which last metal has continued in use.

In those early days we made dozens of tubes for determining the best position of the cathode, and in one of these, which is still preserved, the cathode can be placed anywhere between two and eight inches from the platinum target. We only found that it would not do to have the cathode pushed forward into the bulb itself, although if the tube is to be used with a static machine this position is all right, but will not work at all with the coil. The best distance between the cathode and screen is three to four inches, with the cathode set a short distance back in a tube and quite close to the glass all around.

The first really efficient form of tube that we worked out is shown in Fig. 1; and for not too strong currents it remains to this day the most efficient form of tube we have ever seen. Its particular advantage is, the bulb being quite small, can be made extremely thin—a point of the greatest importance which is generally lost sight of. It will be seen that in this tube the anode and screen are not connected—another supposed recent device—consequently the tubes never blacken however much used. During the process of exhaustion the tubes must be heated in some way. They may be heated strongly with the lamp, then cooled, and the process repeated until a sufficient vacuum is reached; but a tube pumped in this way rises very rapidly in vacuum, and is soon useless. If, however, the current is allowed to pass through the tube during the process of exhaustion, the vacuum will be much more permanent.

This latter method is impracticable if the platinum is made the anode, because long before a vacuum is produced the tube becomes opaque from blackening. Thus the independent anode is of the utmost value in pumping.

In the other form of tube, Fig. 2, the platinum is carried upon a solid glass rod, which rod passes through a hole in the anode at A. The anode is in the form of a triangle and fits snugly into the tube.

It is of advantage to have little space behind the cathode, for the discharge takes place from every part of its surface, and it is desirable that as much as possible of the energy should be directed forward towards the platinum.

The discharge from the back and edges of the cathode can be entirely prevented by coating the back of it with borate of lead, fusing it on. This makes a hard insulating glaze, which the discharge will not break through. As, however, there is usually plenty of current available this is not a point of great importance.

The most troublesome feature about X-ray tubes, as all have found, is the more or less rapid rise of vacuum. Leaving out of account what the cause of this may be, we have every inducement to overcome the difficulty. Potash, as Mr. Rollins says, is not the solution; for, however long it may be heated, water driven out from it soon fails to return, and the vacuum becomes too low. A large bulb lasts longer than a small one, and the life of a small one can be prolonged by attaching to it somewhere an air receiver. This is a clumsy and imperfect solution of the problem, however.

Our first really successful expedient was to dust the inside of the bulb with a finely powdered mineral, which either, by the action of the discharge, produces enough gas to make up for what is lost, or by its mechanical action retains a large amount of occluded gas. Among a large number of minerals tried we have found smithsonite, roasted to a dull-red heat, and spodumene to be most suitable.

A tube with a coating of one of these minerals, and properly pumped, has a life many times longer than has a plain glass tube; and we have several instances of their having been in continuous use for more than a year without the vacuum becoming too high. But the remedy is not perfect and the vacuum does slowly rise, therefore we apply this further remedy. Upon the tube represented in Fig. 2 will be seen a short tube set upon the stem. This tube carries a small inner tube, inside of which is a platinum wire packed with powdered calcite. The wire is provided with an external connection as shown. When the vacuum becomes too high, connection is made with this calcite tube and the current passed for a few seconds. The result is that some carbonic acid gas is thrown off, the vacuum is lowered and the tube has a new lease of life. Of course, some care and judgment is required to have the vacuum just right, but no difficulty is experienced.

How long one of these tubes may last we have no means of knowing, never having been able to wear one out, or rather they have always failed somewhere else rather than from faulty vacuum.

I have not taken space to describe any of our numerous interesting failures, or even promising experiments, but have only indicated those lines along which we have met with success, hoping, if nothing more, that it may save some one the trouble of plodding over ground that we have pretty thoroughly trodden.

Searles Physical Laboratory,
Bowdoin College.

THE COMMERCIAL CABLE COMPANY.

A VERY EXCELLENT SHOWING AT THE ANNUAL MEETING.

The annual meeting of the Commercial Cable Company was held last week. The revenue from the operations of the cable, after deducting all expenses, amounted to $1,200,155, an increase of $76,502 over the previous year. The net revenue from the land lines (Postal Telegraph Company) was $645,185. The net revenue from the combined systems was $1,845,341. Out of this have been met the interest on the first mortgage bonds and debenture stock, dividends of seven per cent on the stock and bonus of one per cent on the capital stock—a total of $1,440,000—leaving the balance of net revenue for the year $405,341.12. The further sum of $250,000 will be set aside and invested in high-class securities as an addition to the reserve fund, which will then stand at $2,608,329. There have been added to the land line system during the year 933 miles of new pole line and 3,966 miles of wire.

The directors elected for the ensuing year were as follows: John W. Mackay, James Gordon Bennett, Gardiner G. Howland, Col. William Jay, George G. Ward, Sir William C. Van Horne, E. C. Platt, the Rt. Hon. Lord Strathcona and Mount Royal, Charles R. Hosmer, Thomas Skinner, Clarence H. Mackay, Albert B. Chandler and Dumont Clarke.

At the meeting of the directors which followed, the following officers were named: J. W. Mackay, president; G. G. Ward, vice-president and general manager; C. R. Hosmer, A. B. Chandler and C. H. Mackay, vice-presidents; E. C. Platt, treasurer; Albert Beck, secretary, and J. O. Stevens, assistant secretary.

Western Office of the Keystone Electrical Instrument Company.

The Keystone Electrical Instrument Company, of Philadelphia, of which Mr. J. F. Stevens is the well known manager, has appointed Mr. W. R. Garton, Ashland Block, Chicago, Ill., its western representative. Mr. Garton's large acquaintance and business activity will undoubtedly result in largely increased western sales of the excellent apparatus manufactured by the Keystone company. Since the first of the year this company has been working night and day to keep pace with its orders, and is now arranging to largely increase manufacturing facilities.

SCIENCE ABSTRACTS.

We present below interesting scientific notes abstracted from the papers of different authors, issued by the London Institution of Electrical Engineers. The author's name precedes each paragraph.

Acoustic Resonators, P. Lebedew—The author investigates the ponderomotor forces due to the mutual influence between the exciting wave and the forced vibrations of the resonator, as distinguished from the direct action of the wave and the reaction of the resonator. He uses a Kundt rod as a source of sound, and a short thin-walled glass tube, tuned by a cork stopper, as resonator. He finds that a plane wave falling on the resonator repels it from the source. This repelling force is a maximum for perfect unison. In the immediate neighborhood of the source the analogy between the behavior of acoustic and electromagnetic resonators is perfect.

Action of Radiation on Sparks, A. Sella — The author describes a quantitative method of studying the action of the radiation from one spark on another. Across the terminals of the gap of the latter spark is connected a coil of wire which is placed in a vessel, of five litres volume, containing air. When a discharge passes part of the current goes through the coil, and the heat produced causes the air to expand, and thus drives a column of mercury along a tube connected with the vessel. There are some pretty and ingenious devices described, for making the vessel act at various temperatures and pressures. The effect of the radiations is to considerably diminish the quantity of heat produced in the shunt coil.

Voltage of an Induction-Coil, A. Oberbeck—The efficiency of an induction-coil should be specified in terms of its maximum voltage instead of its maximum length of spark. The voltage of a terminal may be investigated by attaching to it a needle-point and gradually approaching a charged conductor to it. The potential at any point from the spherical conductor is easily calculated. The distance at which the first permanent deflection of the electrometer connected with the needle-point takes place is called the critical distance, and marks the discharge potential. Measurements thus made show that for a given apparatus and interruptor the ratio of the maximum voltage of the secondary to that of the primary is very nearly constant.

Glow in a High-Frequency Field, H. Ebert and E. Wiedemann—The authors enclosed insulated wires and rods in exhausted bulbs placed between the terminal condenser plates of a Lecher wire system. If a metallic rod lies parallel to the axis of the condenser, a slight evacuation suffices to show a blue glowing light against both ends of the rod on the glass surface, which spreads out in all directions and shows figures resembling the positive forms of Lichtenberg figures. As the pressure is diminished the glow extends towards the dark center of the rods until the ends are joined by a red bridge of light across the middle of the rod. Outside the red light is a dark space, which is succeeded by an equatorial hollow cylinder of reddish light. When exhaustion is carried still further, the various strata coalesce and the appearance begins to resemble that of a bulb without a rod in it. On substituting cylinders for the bulbs and mounting them with their end surfaces towards the condenser plates, the ends of the rod are observed to glow at pressures as high as 50 millimeters, and at the same time cones of light, separated by positive glow, converge from the end surfaces towards the end of the rod. At one millimeter pressure the glow covers the whole rod, and forms a bridge at the center. The formation of the bridge occurs the earlier the narrower the rod.

Capillary Electrometer, U. Behn—This is an experimental test of Warburg's conduction-current theory of the capillary electrometer, which, as far as it goes, results in a verification of that theory. If it is the solution of a mercury-salt which reduces the surface tension of the mercury, this salt must be proved to exist, and its nature must be investigated. To do this, the author employed two beakers containing mercury and sulphuric acid, and joined by a siphon containing an earthenware diaphragm. A current was sent through the mercury, the liquid and the mercury in the other vessel. A salt was actually formed, and proved to be mercurous sulphate. A quantity of this salt was then added to the cathode liquid. The same salt was then observed to be formed in the anode liquid by solution of the anode. When the Hg_2SO_4 was added to both liquids to saturation, crystals of the substance were precipitated in the anode liquid, and mercury was at the same time deposited in the cathode vessel. The amount of mercury so deposited was 94 per cent of the amount expected from the voltameter readings. The remaining six per cent are not yet accounted for.

Gray and Red Incandescence, O. Lummer—H. F. Weber observed in 1887 that the first appearance of light in a glowing substance is not red, but a misty gray, which flits about and can not be accurately located with the eye. This is explained by the author on the assumption that the gray glow is a sensation of the rods in the retina, and the red glow a sensation of the cones. When the gray glow sets in (about 400 degrees) the fovea centralis is unaffected, since it contains cones only. It is, therefore, impossible to fix the eye upon the glowing body, which is only seen by the peripheral regions of the retina. As soon as the red glow begins the center of vision is brought into play, and the image becomes steady.

METHOD OF HANDLING METERS.

HOW THE METER DEPARTMENT OF A BIG CENTRAL STATION IS MANAGED.

The meter department of central lighting stations is one of utmost importance to the lighting business, electric lighting in particular, and this department has in its immediate work the determining of all revenues received by the company, and that it should be conducted under the best possible system can be well imagined by those interested in electric lighting. By carelessness of its employés a customer's bill may be made considerably larger or smaller than it really is, and if the former there is immediate danger of losing the customer, and if the latter, the bill of the next month, which would naturally be larger, would be brought in for comparison, and then more trouble.

It will be interesting to read the details and workings of an up-to-date meter bureau at a large central station, and it is the purpose of the writer to set forth in this article briefly an accurate description of such a department, giving the manner of installing, reading, testing, etc., of meters; and losses to companies by reason of meters of large capacity not recording on light loads.

A room 30 by 30 on the ground floor of a building away from the station some little distance, to avoid any jarring, thoroughly lighted by large windows and overhead by skylights, with two walls built up with shelving, one side for burned-out and damaged meters for repair, and the other side for meters ready for installation, all arranged in tiers according to size and whether two-wire or three-wire, and can be got at without delay, and another wall, occupied by a large meter test board, is the meter department.

The meter test board is quite an elaborate affair, and is the important adjunct to the meter room. It is made of marbleized slate, and stands about two feet out from the wall and four feet from the ground, supported on an angle-iron frame. It is 14 feet long by 8 feet high. On the center slab, running up and down, are the instruments, two Weston voltmeters and one ammeter, and a rheostat, also one single-throw triple-pole switch, and one single-throw double-pole switch. One-half of the board is wired on the three-wire system, and the other side on a two-wire system. On either side there are eight rows of lamps, 12 in each row, of 32 candle-power, and on the center slab three 16 candle-power colored lamps. These colored lamps are to indicate when the board is in use, whether the 220-volt current is used, the two lamps in series burning, or the 110-volt side. At the bottom of each row of lamps is a small snap switch for the turning on and off of one row of lamps at a time. One row can be used, or all the lamps, or as many as is necessary for the capacity of the meter under test. Just beneath these snap switches are flexible, highly insulated cables, three feet long, and at the end of each is a brass coupling made to fit the connections in the meter, and also to fit the brass connections on the board, when the cables are not in use. These cables are marked "Service" and "Lights," and meters for test are connected and tested, as will be explained in another paragraph of this article. For some of the larger meters this board has not the ampere capacity to test them on full load, and as a simple auxiliary resistance to the lamps a water rheostat is used. This is made of an ordinary oil barrel, placed on the roof of the building, or any out-of-the-way place, and controlled by means of pulleys from directly in front of the test board. By the aid of this barrel rheostat a sufficient number of amperes can be had to test the largest meters. The board is amply protected by fuses, and has three cut-out switches, and the danger of injuring meters through carelessness is reduced to a minimum.

The testing of meters comes under the immediate supervision of the meter superintendent, and the manner of test used in the department from which this article is written is as follows:

First, a new meter of the size desired is connected to the lamps on the board, and also with an ammeter, voltmeter and direct-reading wattmeter. For one hour this "test" meter is put on various loads, carefully watched and five-minute readings made from the instruments, and the revolutions of the meter are timed by a stop-watch. Thus, it will be seen that a most careful and accurate check is kept. At the expiration of this test suspicious meters, and, in fact, all meters brought in, as well as those direct from the factory, which by jarring have in many cases either become slow or fast, have to be tested. The test meter and another one are connected together and run for four or five hours on minimum, half and maximum loads. The meter to be tested is carefully watched, adjusted and regulated, and when made accurate is carefully placed upon the shelf marked "Meters for Installation." All meters are tested in this manner, and when one is sent out to be installed it is again subjected to a test for one-half an hour to insure its correctness and accuracy before being put up.

The reading of meters, the bookkeeping, the getting out of bills, etc., in vogue at this station is, no doubt, one of the best systems extant, a detailed description of which has never been made public. The object sought is simplicity and a quick and accurate method of getting results with the least possible cost and delay. This, no doubt, has been done.

GEORGE H. DRAPER.

(To be continued.)

OUR CANADIAN LETTER.

MARKHAM, ONT.—Steps have been taken by the village to rebuild the waterworks and electric light plant.

NANAIMO, B. C.—The Nanaimo Light, Heat and Power Company are seeking for an extension of their powers.

OSHAWA, ONT.—The Oshawa Electric Light Company will purchase 1,500 or 2,000-light alternating dynamos and transformers.

WINNIPEG, MAN.—No decision has as yet been reached regarding the tenders for furnishing an electric light plant. An electrical expert will be engaged to report thereon.

WELLAND, ONT.—The Welland Aqueduct Power Company has been organized to supply electric light, heat and power, with a capital of $25,000.

NAPANEE, ONT.—The town has accepted the proposal of Mr. John R. Scott to supply electric light. Mr. Scott agrees to install an incandescent and arc plant within one year.

SPANISH MILLS—The Massey Station Telephone Company propose to build a telephone line from Spanish Station to Spanish Mills. H. S. Gloves and R. H. Harvey are interested.

MANIWAKI, QUE.—A company has been formed for the purpose of supplying electric light. The directors are Charles Logue, J. P. Tremblay, Dr. Mulligan and Rev. Father Laporte.

RIMOUSKI, QUE.—A company has been formed to construct a telephone line from this place to Matane, and work will be commenced in the Spring. The promoters are J. Elzear, G. Martin and others.

BRIDGETOWN, N. S.—A company is being formed to supply electric light generated by water-power. It is proposed to lay an iron pipe five-eighths of a mile in length. Curry, Bent & Company are interested.

ORILLIA, ONT.—The town council have still under consideration the question of obtaining power from the Ragged Rapids. It is estimated that the necessary plant for developing 1,500 horse-power and transmitting 15 miles will cost from $60,000 to $75,000.

ROSSLAND, B. C.—The *Miner* states that a new project is on foot to supply the mines with electric power. The promoters are installing dynamos at the Kootenay Hydraulic Mining Company's plant on the Pend d'Oreille, back of Waneta, and transmitting electricity to Rossland, a distance of 17 miles. At the outset the plant will have a capacity of 750 horse-power, but will be so constructed as to permit greatly increasing this power. About $170,000 has been subscribed towards the enterprise and there are still some $200,000 shares in stocks in hand. Orson D. Archer & Son, of New York, are the eastern representatives of the project.

J. A. C.

Montreal, March 10.

Electricity at the Omaha Exposition.

At the Trans-Mississippi Exposition at Omaha all the recently discovered appliances for use of the army will be shown and illustrated in a practical manner, and also the system of military telephones which is calculated to aid the commanding general who directs the operations of an army corps in a future battle. By means of this apparatus, which has been perfected by Capt. James Allen, of the Signal Corps, under the direction of Gen. A. W. Greely, it will be possible to string a line of wire from point to point of an army's communications, and use the same wire for both telephoning and telegraphing. General Greely has declared it to be the most notable scientific advance of the year, the importance of which is not confined to military work alone, but may be applied the world over. The whole outfit weighs only 16 pounds, including battery enough to work over any length of line that the corps would probably be called upon to operate. An operator may, therefore, easily carry in his hand a combination telegraph and telephone office. With it, while one operator is engaged in telegraphing a message in Morse characters, another may, over the same wire, talk telephonically with another station, the distant operators hearing only their own messages.

The importance of an exhibition at the Trans-Mississippi Exposition which would combine and practically demonstrate the latest applied uses of electricity was early suggested by the exposition management which finally led to the creation of a bureau of electricity, Prof. R. B. Owens, of the Nebraska State University, director. The applications for space in this section now on file indicates that the field of electrical science will be of wide-reaching interest. Exhibits, it is announced, will be made by Thomas A. Edison and Nikola Tesla.

A Notable Gathering of Newspaper Men in Honor of a Visitor from France.

A number of prominent newspaper men of the country were the guests of Charles Graef & Company at an elaborate dinner at the Holland House, Monday evening, March 7. The banquet was given in honor of Mr. Henry Anger, a partner of Veuve Pommery, Fils & Cie., of Rheims, France, the hosts representing the Pommery champagne in this country.

Mr. Henry G. Graef presided, the beautiful gilt room of the hotel being used for the occasion. The novelty of a welcoming address delivered through the graphophone was an attractive beginning of a very enjoyable evening. In the course of his address, thus delivered, Mr. Graef said :

> We think it fit that a company composed of so much intelligence and enterprise should in some manner recognize the development and progress of the age, and bestow honor on the inventive genius of our own countrymen. To that end I have laid tribute upon science to the extent of making this welcome to you through the graphophone.

The table and rooms were most elaborately decorated with flowers and vines and the silver souvenirs and menus were exceedingly rich and handsome. Mr. William Cullen Bryant, of the Brooklyn *Times*, presided as toastmaster. The first toast of the evening was given by the visitor from France in the following words : "The health of Mr. McKinley, President of the United States," which was received with great applause. Mr. Anger spoke of his visit to the White House and how he was impressed with our Republican simplicity as compared with the royal splendor of the old countries. A number of interesting and witty after-dinner speeches were made by Chester S. Lord, W. J. Arkell, A. E. Bowers, Samuel Walter Taylor and others. Mr. Frank Presbrey was master of arrangements for the occasion and has the honor of having planned one of the most delightful banquets ever given in this great metropolis.

In addition to the representatives of the Pommery Company, among those present were the following well known newspaper men :

Hon. William Berri, *Standard Union*, Brooklyn.
Hon. W. J. Arkell, *Judge*, New York.
Mr. Frank B. Noyes, *Star*, Washington, D. C.
Mr. John A. Sleicher, *Leslie's Weekly*, New York.
Mr. Beriah Wilkins, *Post*, Washington, D. C.
Mr. R. E. A. Dorr, *Mail and Express*, New York.
Mr. Pomeroy Burton, *Eagle*, Brooklyn.
Mr. James Elverson, Jr., *Inquirer*, Philadelphia.
Mr. Chester S. Lord, *Sun*, New York.
Mr. W. J. Connors, *Inquirer*, Buffalo.
Mr. George F. Fielder, *Post*, Hartford.
Mr. Samuel Walter Taylor, *Rider and Driver*, New York.
Mr. Bradford Merrill, *World*, New York.
Mr. Arthur E. Bowers, *Tribune*, New York.

Probably Thought It Was an Electric Wagon.

Recently, says the Boston *Herald*, two gentlemen, driving in a wagonette, were smoking, when a spark falling from one of their cigars set fire to some straw in the bottom of the carriage.

The flames soon drove them from their seats, and while they were extinguishing the fire a countryman, who had for some time been following them on horseback, alighted to assist them.

"I have been watching the smoke for some time," said he.

"Why, then, did you not give us notice?" asked the astonished travelers.

"Well," responded the man, "there are so many new-fangled notions nowadays I thought you were going by steam."

Double-Deck Cars on Broadway—A Good-Sized Bank Account.

The Metropolitan Street Railway Company, of New York, has definitely decided to take out the cable on Broadway and substitute an underground electric system. When the new electric system is inaugurated, it is proposed to put on double deck cars, not only on Broadway, but also on Sixth avenue.

At present the company has nine power houses. It is proposed to reduce the number to three. We understand that the company has about $7,600,000 of cash in bank.—*Boston News Bureau.*

Warren-Medbery Company.

The Warren-Medbery Company, of Sandy Hill, N. Y., has been incorporated to manufacture electrical supplies ; capital, $25,000. Directors: Horace J. Medbery and S. C. Medbery, of Ballston Spa ; H. B. Warren, of Yonkers, and W. H. Cunningham, H. E. Tidmarsh, Lincoln Paris and G. W. Wait, of Sandy Hill.

Arizona News.

[*From the San Francisco Call.*]

C. T. Rittenhouse, former editor of the *Electrical World*, New York, is a late arrival in Tucson. He is in search of health.

A Modern Direct-Driven Dynamo.

The Western Electric Company, of Chicago, some time ago placed on the market a line of direct-driven arc dynamos, connected to Willans engines, which, judging from recent tests, bid fair to become widely adopted by the modern engineer. Our illustration shows one of several of these sets recently installed in Detroit, where the apparatus not only demonstrated its high economy under normal conditions, but also took an overload of from 50 to 70 per cent for some time without any injurious results.

The dynamos are of the bi-polar, horseshoe frame type, have ironclad armatures, and self-oiling, self-aligning bearings, provided with visual oil gauge and drain. With the construction adopted, the removal of the armature for examination or repairs is a very simple matter. The bearing bracket affords a convenient seat on which the armature rests; at the same time the armature is very rigidly supported, as the end of the shaft rests in the pulley end bearing. This allows the armature to be worked upon conveniently.

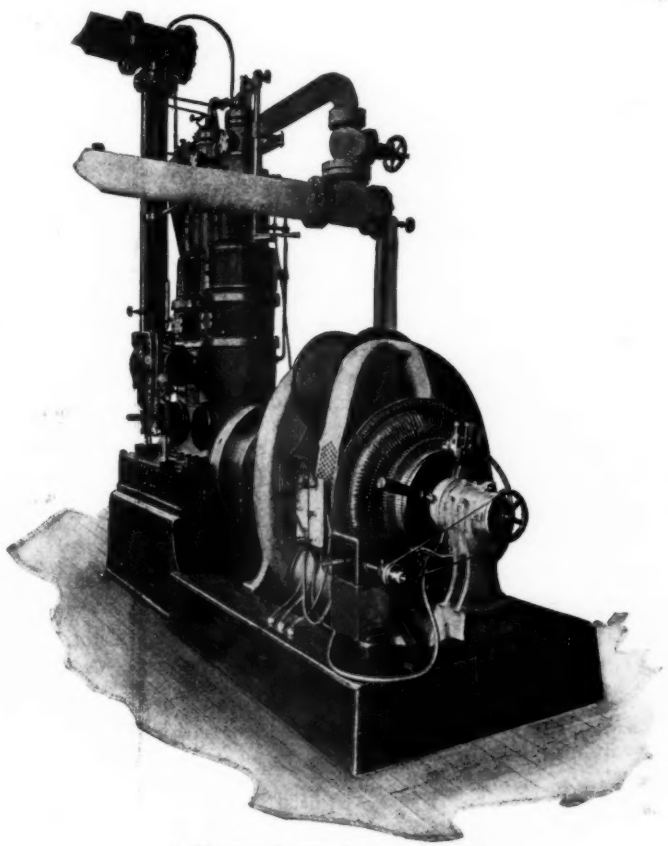
The bearing may be removed in about five minutes, the pulley in three, and the commutator in ten to twenty minutes. The average time taken for one man and helper to wind an armature coil for an 80-light machine is 50 minutes, the coils in this armature being of average size.

These points are fully appreciated by all central station managers, and especially by those who have had occasion to completely dismantle their dynamo so as to examine the armature.

The operation of the machines is all that the most critical can desire. The lamps can be thrown on or off in groups equal to 20 per cent of the capacity of the machine from full load down to short circuit, or vice versa, and the regulator will compensate for the changes without flashing the machine. Or the whole load may be thrown on or off instantly, and the regulator will compensate for the change in a few seconds.

The machines withstand without injury the ordinary accidents of operation, such as open circuit and short circuit, and either side of the circuit may be grounded to the frame and the circuit opened without injuring the insulation. A test was recently made to ascertain the rise in potential at the terminals of an 80-light machine. A load of 90 lamps on a very short line was put on the machine and the line opened as nearly instantaneously as possible at the switchboard. The potential was taken at the terminals of the machine with a Weston voltmeter. With the machine running at 4,500 volts the voltmeter swung up to 5,500 volts; when the circuit was opened, at a load of 3,300 volts, the needle swung to 4,400.

The machines are designed to run 14 hours on any load from dead short circuit to full-rated capacity, without heating any part more than 80 degrees Fahrenheit above the surrounding air.



A Modern Direct-Driven Dynamo.

LITERARY.

The March *Home Magazine*, with a handsomely engraved picture of the ill-fated warship "Maine," and with an article of exceeding patriotic interest on the life of Captain McGiffin, the American hero of the recent Chinese – Japan war, is especially timely just now. Aside from these strong features, in a general pictorial and literary way the March number will be found to surpass any previous issue of this uniformly good periodical.

The March number of *McClure's Magazine* might be characterized in a sentence as a literary and pictorial exposition of the heroic side of real life. A letter from Nils Strindberg, one of the two men who have gone no one knows whither with Andrée, in the bold endeavor to reach the North Pole by balloon; Mr. Walter Wellman's predictions as to the probable fate of the Andrée party; Herbert E. Hamblen's account of his own adventures as a locomotive engineer; and a true story of the ingenuity and bravery of a Chicago fireman — all dealing with matters of fact, are still full of the very stuff which the novelist (too often in vain) beats his brains for. Charles A. Dana's personal recollections of Grant, Sherman, Gordon Granger, and "Fighting Joe" Hooker, as he saw them in the midst of the particularly "spectacular military movements" of the battle of Chattanooga: and of Secretary Stanton, as Mr. Dana worked with him day and night in the War Department—still further emphasize the heroic side of life.

A New Incandescent Light.

Dr. Nernst, Göttingen, Austria, has a new incandescent light. The alternating current is used, and he has discovered "a new incandescent body for electric lamps," which heretofore was believed to be a non conductor. As prepared by the doctor these "bodies will resist high temperatures for a long time."

PERSONAL.

John C. Brackenridge, who has been the engineer of the track department of the Brooklyn Heights Railroad for the past four years, has been made chief engineer of the entire system in place of J. T. Whitlesey, resigned.

Mr. George Bullock, president of the Bullock Electric Manufacturing Company, of Cincinnati, has gone to San Francisco to superintend the installation of a dozen new electric motors recently shipped to the San Francisco *Examiner*.

Mr. Robert Edward Peake, A. M. I. C., electrical engineer of the firm of Clarke, Forde & Taylor, No. 4 Great Winchester street, London, was in New York for a few days on his way home from Jamaica. Mr. Peake was on board steamship "Scotia" on behalf of the Direct West India Cable Company during the laying, by the Telegraph Construction and Maintenance Company, of the direct West India cable from Bermuda to Turks Island and Jamaica; has done telegraph and cable work all over the world, and in 1895 he observed on behalf of the owners the laying of the cable in the bed of the Amazon River from Para to Manaos. Mr. Peake's visit to New York was made quite enjoyable by the courtesy of the Commercial Cable and Postal Telegraph officials.

Syracuse Rapid Transit Company.

The statement of the Rapid Transit Company, of Syracuse, N. Y., for January shows a substantial increase in the earnings over the corresponding months last year, and a decrease in operating expenses. The gross earnings of January last year were $32,190.40, the earnings this year being $37,487.44. The operating expenses for January this year were $20,548.92, as compared with $24,011.52 last year. The net earnings for January this year were $16,938.52, as compared with $8,178.88 a year ago.

Bell Telephone Output.

Bell Telephone reports its instrument output for the month ending February 20 as follows: Gross, 25,897, an increase of 6,217; net, 13,107, an increase of 1,442. Since December 20, gross, 51,758; increase, 17,641; net, 28,927; increase, 9,226. Total outstanding, 951,180, an increase of 157,630.

The Kentucky Electric Light Company, of Ludlow, Ky., with $30,000 capital stock, has been incorporated.

Electrical Review

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News, Subscriptions and Advertisements.

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The Institution of Electrical Engineers, of London, has done itself proud in its treatment of Mr. Francis H. Webb, who was the active secretary of the institution for a great many years. Mr. Webb recently resigned the active secretaryship and was made honorary secretary, being retired on a pension. The institution has also presented to him a testimonial in the form of a check for more than $3,000, and has given to Mrs. Webb a diamond brooch.

OVERHEAD TELEPHONE LINES AND STORMS.

During the Winter just closed there have been several snow, sleet and wind storms which were especially destructive of overhead telephone lines. The greatest damage done by these storms was in the territory embraced in the New England States. The money loss in one instance was over $100,000, besides the loss of business incident to the crippling of the line. Of course, such large losses could not occur except to overhead lines. During the same storm noted above, the New York Telephone Company, whose lines are largely under ground, did not lose a single wire. This is true of most of our large cities, where telephone lines are rapidly being installed under ground, and it is also true that in the business portions of a great number of cities and towns there are no overhead telephone lines. The day may not be very far off when all telephone wires, both city and suburban, will be placed under ground, principally, of course, for economical reasons.

ANOTHER BRITISH FAILURE.

The proverbial slowness of the British mind to grasp a humorous allusion or situation was never better illustrated than in the following reply to some comments made by the ELECTRICAL REVIEW. The quotation is from London *Lightning:*

By the way * * * I note a paragraph which appeared in the ELECTRICAL REVIEW many months back, and which had almost escaped my memory. It was in reply to some comments of mine on a certain "clambake," and was intended to enlighten me as to the nature of the America cordial "sarsaparilla." After suggesting that Mr. Phillips should forward me a bottle of the said cordial, that I might know what it was like, our contemporary concludes: "With a bottle of this beverage in one hand and one of the wooden cigars Mr. Magden (*sic*), of *Lightning*, acquired at Niagara Falls in the other hand, our esteemed *confrère* would be in an ideal attitude to write funny things about American institutions." This strikes me as a very fine specimen of an American bull: with both hands occupied, I don't quite see how I could write at all, unless I held the pen in my teeth. * * *

Isn't that rich? Read it again, brother, read it again.

SUBMARINE ELECTRIC LIGHTS.

The diving operations about the sunken wreck of the "Maine" in Havana Harbor have been seriously hampered, owing to the muddy state of the water, which has almost prevented the divers from properly performing their work. Submarine electric searchlights were used, the current being supplied from the plant on the lighthouse tender "Mangrove," which was stationed near the wreck. Just what the capacity and intensity of these searchlights were has not been made known, but it is apparent that there is room for inventive genius to be displayed in this direction. We believe that the first successful use of submarine electric lights by divers was made when a wrecking crew searched for the treasure supposed to be on the sunken "Hussar," off Port Morris, N. Y., which was described in the ELECTRICAL REVIEW some years ago. Since then it is believed that very little progress in this direction has been made.

The adoption to a large extent of American electric railway apparatus and engineering talent in England has already become historical, and it now seems that Americans will also have an opportunity to invade France. The Department of State is authority for the report that the city of Niorte, France, proposes to have an electric railway and electric street lights. Communications on the subject should be addressed to the Mayor of the city of Niorte, Deux-Sèvres, France. There is also a movement on foot to connect La Rochelle with the new port, La Pallice, by an electric railway two and one-half miles long. Information on this question may be obtained from P. W. Morch, Chamber of Commerce, La Rochelle, France. It is probable that American bidders, in addition to French competitors, will have to meet British prices also.

There is life and enterprise throughout the electrical industry. The only complaint to be heard is that prices are too low—that the hard-times competition of the past three or four years has brought prices to an unprofitable minimum. If the present demand and activity continue, we think this situation will soon be remedied.

Immediately after the telephone-rate editorial appeared in the ELECTRICAL REVIEW last week the extremely unfair telephone bill before the Assembly at Albany, N. Y., entered into a moribund condition. We do not think it will be resurrected. Modesty ends this comment.

American electrical inventors will doubtless be interested in the fact that a prize of $3,000, named in honor of Galileo Ferraris, will be awarded at the approaching exhibition at Turin, Italy, for the most valuable invention exhibited for the application of electricity to industrial purposes.

A press dispatch from Cleveland, Ohio, states that the reason for the collapse of the big wire and rod pool is that J. Pierpont Morgan & Company, who are large backers of the enterprise, refused to advance funds to perfect it, because the owners of the Washburn & Moen mill at Worcester, Mass., placed what they believe is too high a valuation upon their plant. The owners wanted $8,000,000 for their plant, and J. P. Morgan & Company would give only $6,000,000. Several Cleveland concerns admit that the deal is off.

The Canadian Pacific Railroad Telegraph Company intends to stretch a copper telegraph wire from Montreal to Vancouver, and thus the 2,910 miles of Canadian territory—from the Atlantic seaboard on the east to the Pacific on the west—will be connected by an unbroken band of copper. It will then be possible for the operator to sit in the office here and transmit messages to Vancouver direct. The wire to be used will weigh 300 pounds to the mile, and the total weight of copper will be about 450 tons. It is expected to begin work on the new line not later than April 1, and to have it completed and working by mid-Summer. It will have automatic repeaters at Fort William, Ontario, and Swift Current, N. W. T. The wire will be worked duplex; viz., two messages at the same time in opposite directions. The copper will cost about $250,000.

Wall Street and the Electrical Stock Market.

It is the prevailing uncertainty as to what may be done rather than the apprehension of actual war with Spain which has depressed the trading, and until this feeling is removed no activity in the securities markets need be looked for.

The various electrical stocks suffered from the limited business in common with the rest of the list. General Electric was quiet, fluctuating between 30 and 33. Some of the debenture 5's sold at 101¼.

Edison Electric Illuminating of New York was practically neglected, only a small sale being reported at 130. An additional $1,262,000 capital stock was listed on the New York Stock Exchange during the week.

Western Union sold up from 84¼ to 87⅛ on Wednesday, and then lost its gain when the rest of the market declined. The debenture 5 per cent bonds sold early in the week at 110. The regular quarterly dividend of 1¼ per cent was declared payable April 15. The statement for the quarter ending March 31, partly estimated, compares favorably with the actual figures for the same period last year. The net revenues increased $110,467, and after paying the dividend the total surplus showed an increase of $216,102.

American Telegraph and Cable declined from 90 to 89 on sales of less than 200 shares.

Mr. Whitney's absence in the South has caused a postponement of some plans of the Metropolitan Street Railway Company. Considerable interest attaches in Wall street to the reports from good sources that the company contemplates the substitution of electricity on Broadway and also on the Sixth avenue line, the change to be effected in the near future. It is interesting to note that the Manhattan Elevated is said to have placed an order for air-brakes for use on cars operated by electricity.

Throughout the fluctuations of the general market North American held steady at from 5⅜ to 5⅞. The Stock Exchange has listed $603,000 additional 5 per cent consols of the Milwaukee Electric Light Company.

The United Traction and Electric Company has declared a dividend of 1 per cent, payable April 1.

On the Boston Exchange, Bell Telephone on Monday sold at 251½, a decline of 8½ points as compared with Saturday, but rallied during the day to 256, selling down to 246 on Friday. Total sales for the week were only 872 shares. Erie Telephone lost 1½ points Monday to 66½, regained its decline on Wednesday, subsequently selling at 66. General Electric preferred was quiet, one sale of a fractional lot being reported at 89. New England sold during the week at 125 and 126, closing 125 bid, 127 asked.

In Philadelphia, Electric Storage Battery common gained 5½ points on Thursday to 24½, losing over half its gain on Friday, closing at 21½. The preferred stock advanced in sympathy with the movement in the common stock, selling at 26¼ Thursday and reacting to 22½ on Friday. Pennsylvania Heat, Light and Power opened at 21, sold down to 20, up to 22½, closing near the top figure.

General Electric on Saturday touched 29, closing at 29¾ bid, 30 asked; Western Union sold down to 83½ and closed 84 bid, offered at 84¼; North American was very active between 5¼ to 5⅛. RAY.

Wall Street, March 12.

Telephones in Use in the United States.

A misunderstanding exists in some quarters over the monthly instrument statements issued by the American Bell Telephone Company. It has been figured that the 951,180 telephones outstanding, owned by the American Bell Telephone Company, show that, with a population estimated at 73,000,000 by the Treasury Department, there is a telephone in use for every 77 people.

It is evident that it is not generally understood that the Bell company counts every complete telephone as two instruments; that is, the receiver is counted as one instrument and the transmitter as one instrument, so that, as a matter of fact, the company's last statement showing 951,180 telephones outstanding means that its sub-companies have 475,590 complete telephones outstanding, or a telephone to every 154 people in the United States.

This, of course, does not take into account the thousands of telephone instruments in use not controlled by the Bell company. The fact that the instruments in use have increased the past year 20 per cent is considered a good indication of the increase in general business, and also accounts in a measure for the loss of telegraph companies on local business.

Copy was received from several new advertisers this week too late to be included in our advertising pages. We publish this in explanation. These advertisements will appear in the ELECTRICAL REVIEW next week.

National Electric Light Association.

As already announced in the ELECTRICAL REVIEW, the next meeting of the National Electric Light Association will be held at Chicago on June 7, 8 and 9 at the Auditorium Hotel. The Auditorium banquet hall in which the sessions of the convention will meet is one of the finest assembly rooms in the country. In the hotel parlors and basement space will be furnished for exhibits, but there will be no general exhibit, the manufacturing and central station interests having agreed upon this point.

The plant of the Chicago Edison company will be open to inspection during the convention and the company will also afford facilities for manufacturers to display their specialties in actual operation at the Edison plant. The local street railway and elevated railway companies have given assurances that they will co-operate with the local lighting companies to give the visiting delegates an opportunity to observe the advancement that has been made in the electrical development of Chicago since the last convention in that city. Last Thursday a number of gentlemen were invited to confer with President Insull upon the arrangements for the entertainment of visitors during the convention. Many plans and suggestions were considered which will be duly announced. In the meantime President Insull will confer with the eastern representatives of the association and another meeting of the Chicago committee will be held on March 24, at which time the views of the eastern members will be heard and final action taken. It is proposed to hold the business sessions of the convention during the mornings and evenings of the dates named, devoting the afternoons to entertainment and sightseeing. This plan has been tried at the conventions of the Association of Edison Illuminating Companies, and has proved satisfactory and popular.

Electric Lighting in the Arctic Regions.

Electricity for purposes of street illumination in the far north is growing rapidly in favor, says a London exchange. The first town to adopt this form of illumination was Hammerfest, Norway, which lies north of latitude 70 degrees, and now Tromsö is also lighted by electricity, which, during the long Winter nights, can certainly be used there to advantage.

LATE NEWS.

The Erie Telegraph and Telephone Company increased its wire mileage in 1897 thirty-three per cent, having constructed 14,000 miles, most of which was copper.

The City Council of Cumberland, Md., by a vote of 10 to 1, recently granted the Maryland, Pennsylvania & West Virginia Telephone and Telegraph Company a franchise to install a telephone system.

The Erie Telegraph and Telephone Company has recently consummated an arrangement by which it absorbs the local telephone exchange in the city of Beaumont, Tex. The exchange has something over 100 subscribers.

The New York market for copper was very strong toward the close of last week, with no offerings under 12 cents. Sellers are indifferent and content to let the market take its course, fully conscious of its staying powers.

The plant of the Lyons, N. Y., Gas Light Company was demolished by an interior explosion which occurred at 9.30 o'clock on Monday morning of this week. George F. Sturges, who is believed to have been in the purifying room, can not be found. Loss, $10,000.

It is reported that Mr. Vanderbilt has decided to broaden out the management of the New York Central Railroad considerably, and that one of his pet schemes is the introduction of electric power to move trains in and out of the Grand Central station, New York city, and to establish a distributing center outside of the city limits for all trains.

Lord Kelvin's Patents.

Before the Philosophical Society at Glasgow, on the 23d ultimo, Dr. Magnus Maclean read a paper on "Lord Kelvin's Patents," says our London namesake. There were, he said, altogether 47 patents from February 20, 1858, to September 28, 1896—a period of 38 years. All of them could be conveniently classified under four heads: A. Patents relating to improvements in electric telegraphic apparatus. B. Patents relating to improvements in navigational apparatus. C. Patents relating to improvements in generating, regulating, measuring, recording and integrating electric currents. D. Improvements in valves for fluids. Under the first head (A) there are 11 patents. Under the second head (B) there are 10 patents. Under the third head (C) there are 24 patents. Under the fourth head (D) there are two patents. There are up to September 28, 1896, 47 patents.

MAGNETIC ORE SEPARATORS.*

BY PROF. W. A. ANTHONY.

From an early date the idea has been entertained of separating magnetic from non-magnetic substances by the use of the magnet, but up to a very recent date it had hardly been thought of to do more than separate iron from other substances, or magnetite and, perhaps, pyrrhotite from other ores. The magnet has been used for separating iron chips and turnings from the brass chips collected in shops where both metals are worked together. Special magnetic separators have been devised for the separation of iron from rags used for making paper, and for separating from paper pulp the finely divided iron that is ground up with the rags in the paper engine, or that comes from the wear of the engines themselves.

Numerous magnetic separators have also been devised for separating magnetite from other ores, or from other substances with which it is often found associated, and descriptions of such machines, in which electro-magnets were used, will be found among the patents granted nearly 50 years ago, when the only sources of the electric current were the primary batteries then in use. With such sources the cost of the electric current was, however, too great to warrant a very extended use of magnetic separators, and until the invention of the dynamo machine reduced the cost of electrical energy, inventors and users of such separators generally had to content themselves with such results as could be obtained by the use of permanent steel magnets.

The advent of the dynamo machine, however, gave a new impetus to the design of magnetic separators, and from 1880 to the present time a great variety of such machines have been invented, making use of electro-magnets energized by means of currents from dynamo machines.

The ways in which the powerful magnetic fields thus placed at the command of the inventor have been utilized to effect the separation of the magnetic from the non-magnetic materials, are various and often interesting from the ingenuity displayed.

But, however various the different forms, the general principle is always the same. The mixed materials are carried into a magnetic field where the magnetic portion is diverted from the course it would otherwise take, and is thus separated from the non-magnetic portion and carried away and deposited by itself.

* From *Cassier's Magazine.*

ELECTRIC RAILWAY NOTES.

The Chattanooga, Tenn., Electric Railway Company contemplates the erection of a transfer station on Broad street.

The Temple Street Cable Railway, of Los Angeles, Cal., has been sold under foreclosure proceedings for $90,000 to the bondholders.

The property and franchises of the Lynchburg, Va., Electric Company, including the street railway, have been sold at public auction, under authority of the United States District Court, for $31,500 to Walter S. Johnson, president of the American Surety Company, of New York.

The White Traction Company, of McKeesport, Pa., which heretofore has been unable to get its street railway into the city, has purchased $100,000 worth of private property between Riverton and the B. & O. depot, and will build elevated tracks from the Riverton Bridge to Jerome street.

At the annual meeting of the stockholders of the West Newton, Pa., Northern Railway Company the following directors were elected: W. W. Patterson, of Homestead, president; J. O. Tosh, of Pittsburgh; F. M. Null, Dawson; C. M. Suter, of Suterville; Dr. J. N. Weddell and T. F. Van Kirk, of West Newton. The proposed line is a trolley to extend from Bellevernon, and will be 20 miles long.

The report of the Rome City, N. Y., Street Railway Company for the quarter ending December 31, 1897, shows: Gross earnings from operation, $996.10; operating expenses (excluding all taxes), $1,360.41; net loss from operation, $364.31; income from other sources than operation, $ 4.50; gross loss from all sources, $269.81; taxes on earnings and capital stock, $25.98; net loss from all sources, $295.79. The same quarter in 1896 showed a net loss of $267.95.

Augustin Coputo has entered suit against the United Traction Company, of Pittsburgh, Pa., to recover $10,000 damages for personal injuries alleged to have been received at the hands of two employés of the defendant company. He alleged that on February 19, 1898, he boarded a Second avenue car and was carried beyond his destination. After some words, he claims, the conductor knocked him off the car, and then followed him, when another employé took a hand in the altercation. The plaintiff declares one of them struck him with a piece of iron and broke his skull, and also that his nose was broken in two places.

A Large Electric Traction Generator.

What is claimed to be the largest generator for electric traction work ever built is now under construction at the works of the General Electric Company at Schenectady, N.Y. When finished it will be installed at the Logan street station of the Louisville Railway Company, Louisville, Ky. On account of its large diameter the armature of this generator can not be transported over the railroads in its completed state, either erect or on its side. The generator will therefore be assembled in Louisville. The completed machine will have 22 poles, an output of 2,400 kilowatts, or 3,000 horse-power, and will be driven at a speed of 75 revolutions per minute by a 4,000-horse-power cross-compound engine to be furnished by the Allis company.

The generator will be constructed to stand an overload of about one-third, so that the capacity in case of emergencies may equal 3,200 kilowatts, or over 4,000 horse-power. The principal dimensions of the machine will be as follows: Diameter of field frame, 19 feet; width of field frame, 4 feet 1 inch; diameter of armature, 12 feet 9 inches; diameter of commutator, 9 feet 8 inches; diameter of shaft, 2 feet 3 inches. Total weight of armature and commutator, 83,000 pounds. Width of armature, 5 feet; width of commutator, 21 inches. Total width of generator, 77 inches. Total weight of generator complete, 174,000 pounds.

Previous to the manufacture of this machine the largest generators constructed for electric railway work were those of 1,600 kilowatts, or about 2,500 horse-power, the first of which was used in the Intramural power-house at the World's Fair. Dynamos of the same enormous output have since been installed in Philadelphia, Boston and Chicago. Four are also operating in the Kent avenue power station of the Brooklyn City Railroad, and two of similar size are now being added. At present this power-house contains the largest single exhibit of moving machinery in Greater New York. In no other city of the state, with the exception of Niagara Falls, can 10,000 horse-power in engines and dynamos be seen in almost constant daily operation.

The Jansen Kill Electric Power Company, of Hudson, N. Y., has been incorporated. It is proposed to maintain a series of dams in the counties of Columbia and Dutchess. The capital stock is to be $100,000.

NEWS NOTES.

About $100,000 is involved in a suit begun in the Circuit Court, at Chicago, by the Siemens & Halske Electric Company against the Wells & French company and O. W. Meysenburg. The latter having been president of both companies named at the same time, is accused of favoring the Wells & French company to the detriment of the complainant company.

The City of London Electric Lighting Company, Ltd., has given notice that, due to the excellent financial results of the company's operations for the year 1897, they have reduced the scale of charges for the supply of electric energy. The charges are modified on a sliding scale in proportion to the amount consumed and divided into two classes, namely, for lighting purposes and for motive power for heating and cooking. Mr. J. Cecil Bull is manager and secretary of the company.

The American Medical Association, the largest medical body in this country, is endeavoring to have created a National Commission of Public Health. The bill has been introduced in the House of Representatives, and was indorsed also by the American Public Health Association at its twenty-fifth annual meeting, held in Philadelphia, last October. The new commission, if created, will take the place of what is now known as the Marine Hospital Service, the commission being broader in scope.

Claim of the National Conduit Company Against a Receiver.

The National Conduit Company, of New York, has filed a complaint against Talcott H. Russell, receiver of the Connecticut Pipe Manufacturing Company, alleging the infringement of its patent covering a conduit pipe, constructed especially for carrying underground electric wire. The National company recently won its suit against the Connecticut company on patent infringement, but before the case was decided the latter company had gone into the hands of a receiver. A communication appeared in the ELECTRICAL REVIEW last week from the receiver, Mr. Talcott H. Russell, giving a legal opinion that the suit won by the National company did not extend to the receivership. It is evident, however, that the National company thinks otherwise, and has filed its claim for infringement damages against the receiver.

The Passenger Kept His Seat.

[From the New York Sun.]

Anybody could tell that he had never been across the Bridge on a trolley car before. Everything interested him. He turned and twisted like an eel, trying to keep an eye on both sides of the car lest he should miss something. It was only when the car swung around the curve at the Park row end of the Bridge that he lost interest. Then he folded his hands over the curve of his waistcoat and stared stonily in front of him. He was little and plump and middle-aged.

"Aw-newaw-waw-newaw-waw-whoop!" yelled the conductor in that strange language spoken by railroad employés. This observation means, "New York; all out here."

The little man didn't stir, and apparently didn't even see the glance of contemptuous disfavor which the conductor bestowed upon him.

"N'York, all out," shouted that functionary point-blank at the man who still sat and sat still after all the other passengers had left the car, but it had no effect. The conductor stepped inside and said:

"Say, you got to get off. This is New York," at the same time putting his hand on the persistent passenger's arm.

"Take your hands off me," he said so sharply that the conductor jumped.

"You going to get off, or ain't you?" he said, recovering himself.

There was no answer.

"Say, Jim, call the inspector. Here's a feller that won't get out," the conductor bawled to the motorman.

In hustled an inspector.

"Here, here," he said to the little man, reaching toward him. "What's the matter with.——"

"Keep your hands off," snapped the passenger so threateningly that the other stepped back and said to the motorman:

"Call a policeman."

In came the policeman with the conventional "What's the matter here?" on his lips.

"This is as far as you can go on this car," he explained, mildly, to the obstinate passenger. "This car goes back to Brooklyn."

"So do I," said the little man.

The policeman went out. The motorman and the conductor, who had been expectantly waiting to see the man "fired," looked at each other foolishly. The little man pulled out a nickel, and looked at it affectionately.

"I thought there wasn't any rule against it," he said, softly, to the nickel. Then he grinned genially.

Amateur Model-Making Competition at the Electrical and Kindred Industries Exhibition.

A committee, consisting of Prof. Morris Loeb, Dr. C. A. Doremus, Dr. W. E. Geyer and Mr. T. C. Martin, has drawn up rules and regulations for an amateur model-making competition in connection with the electrical exhibition. Printed forms can be had at the office of the association, 15 Cortlandt street. Each class will have prizes not to exceed $50 and bronze medals, the exhibits to be judged by a committee of five well known men. It is believed that the contest will awaken general interest and elicit some beautiful and interesting apparatus. There are a great many young people and students in and around New York who find pleasure in handiwork of this character. The classes are as follows, and the exhibits must be entered a week before the exhibition begins:

Class A—Working model or actual machine of a dynamo-electric or electro-dynamic type; made by one or more boys under 21, so far as designing lathe work, assembling and finishing are concerned.

Class B—Instrument of precision, made by amateur or student; including galvanometers, resistance bridges, etc.

Class C—Practical application of electricity to communication, the assembling and finishing to have been the work of a single exhibitor.

Class D—Ingenious application of electrical appliances to domestic, etc., uses by an amateur under 18; none of the apparatus to be necessarily of home manufacture.

Class E—Design or working drawing of an electrical appliance or installation made within the past twelvemonth by a student of a recognized chartered institution, and bearing the instructor's certificate as to its bona fides.

Class F—Design or instrument made by a teacher, below the grade of college professor, for illustrating some electrical law.

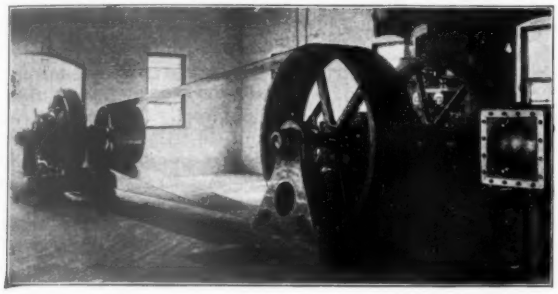

FIG. 1.—AN INTERESTING ELECTRIC MINING INSTALLATION.—INTERIOR VIEW OF POWER-HOUSE.

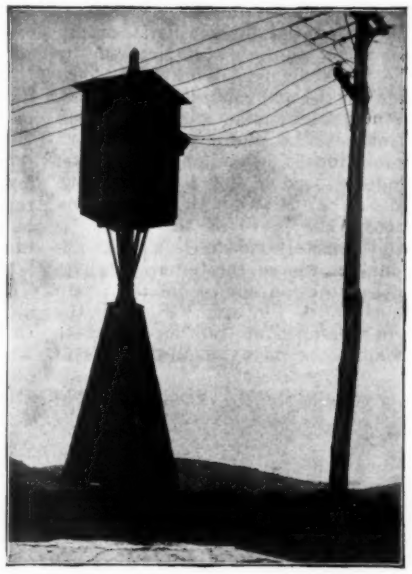

FIG. 2.—AN INTERESTING ELECTRIC MINING INSTALLATION.—POINT OF SUSPENSION OF FEEDERS.

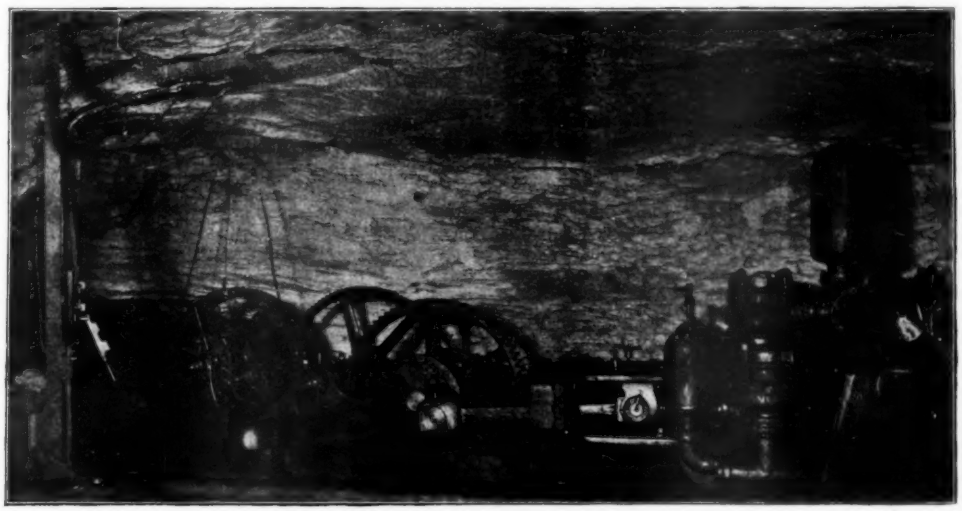

FIG. 3.—AN INTERESTING ELECTRIC MINING INSTALLATION.—TEN BY EIGHTEEN-INCH PUMP WITH 85-HORSE-POWER MOTOR.

An Interesting Electric Mining Plant.

In the mines of the Lehigh Valley Coal Company, four miles north of Wilkesbarre, Pa., an interesting electrical installation has been in operation during the past year. The main workings of the mines are under the Susquehanna River flats, eastward from the shaft toward that river from the Wyoming Hills—the western outcrop of the anthracite coal belt. As the workings were greatly extended the problem of handling the constantly increasing volume of water became daily more difficult and the haulage of coal by mules more expensive. A steam plant on the flats was impracticable on account of their submersion, and after careful investigation the company decided to use electricity for the operation of the mine pump, and an electric cable hoist for the haulage of the coal over an extension of the main gangway.

The power-house is placed near the head of the main hoisting shaft and contains the main hoisting engines, the generator and its driving engine. Steam is supplied from a battery of boilers set in another house about 200 feet away. The dynamo is a General Electric slow speed 150-kilowatt direct-current six-pole machine, driven by a Ball automatic tandem compound non-condensing engine. The speed of the engine is 200 revolutions per minute, that of the generator 400 revolutions per minute. The generator is compound wound for 500 volts at no load and 550 volts at full load. An oak switchboard is placed against the wall of the engine-room and current passes from the generator to the switchboard through heavily insulated copper cables suspended on porcelain insulators in a conduit under the floor. The conduit is provided with a removable cover,

allowing ready access to the cables. The board is provided with two double-pole feeder switches for the pump and hoist circuits, in addition to the main double-pole station switch. The pump circuit is protected by fuses, the hoist circuit by an automatic circuit-breaker. From the two feeder switches the pump and hoist circuits are carried to the pole line. The positive and negative sides of each circuit are connected to suitable lightning arresters to protect the instruments and generators from the destructive effects of lightning.

The pole line runs from the station to a point almost above the center of operations, and the wires are run through a bore hole especially drilled for that purpose. The poles are 30 feet long, and each carries one four-pin cross-arm with iron braces, wooden pins and glass insulators.

The positive feeders for the pump and hoist circuits consist of two separate 0000 Brown & Sharpe wires, and two 0000 Brown & Sharpe wires provide a common return. At about 5,000 feet from the power-house two bore holes, each 350 feet deep, are driven from the surface of the flats. One is provided with a six-inch iron pipe as a casing for the wires, the other with a 12-inch casing for the pump discharge. The six-inch pipe rises about 18 feet above the surface of the ground; the opening is thus protected against any great rise of water during freshets. A small cable house is supported on this pipe, into which the line wires pass and make connection with the cable in the bore hole. The two positive feeders are connected to two separate cables, the two common return wires to one large negative cable; each cable is heavily insulated with rubber and jute braid and then leaded and armored with iron wire, protected from corrosive and electrolytic action by tarred jute. The cables are supported from the top of the stand-pipe. The method of suspension of the cables is unique. Six cast-iron plates, one and one-fourth inches thick and 18 inches square, are drilled with three two-inch holes close together near the center of the plate. The six plates are placed one above the other on top of the stand-pipe, and the cables pass through the holes in all of the plates. The six plates are divided into three sets, each two in a set forming a clamp, tightened by several small bolts. As one cable passes through the bottom clamping set the iron-armored wires are spread out and tightly clamped between the two plates. Another passes through the hole in the first set and is clamped between the plates of the second set, the third armored cable being held between the third set. Each cable is therefore supported by its own armor and a separate clamp. Three additional lightning arresters protect the cable and line wires in the cable tower.

At the bottom of the hole the cables are connected by single-pole switches to the circuits operating the hoist and pump 600 feet distant. These underground wires are double-rubber covered, and are supported on glass insulators fastened to props along the ribs. A wooden switch-board carrying fuse boxes, main switch and starting rheostat for the pump is erected in the pump chamber.

The motor for this pump is mounted on a cast-iron bed-plate, and is geared by a double-reduction gearing to the crank shaft operating the plungers. The motor is a General Electric shunt-wound machine, with a capacity of 85 horse-power continuously at a speed of 700 revolutions per minute. The pump is a duplex, double-acting pot-valve pump, manufactured by the Jeansville Iron Works, with outside packed and connecting plungers, 10 inches in diameter by 18-inch stroke. The pump capacity at 25 revolutions is 600 gallons per minute, under a head of 360 feet. As with all pumps operated with shunt wound motors the speed of the gearing is approximately constant—a great advantage where the pump receives little attention and where the pump capacity is limited. Should the pump happen to run on air there would be no racing, as in the case of air and steam pumps, and the amount of energy consumed is only that required to overcome the mechanical friction of the rotating parts. The suction pipe drains from a large sump near the pump chamber, and the water passes up through the 12-inch bore hole to the surface, where a check valve prevents the water returning during any freshets when the pump is not in operation. A small four-inch by six-inch triplex plunger pump geared to a five-horse-power multipolar slow-speed motor pumps water up the small slope to the large electric pump.

FIG. 4.—AN INTERESTING ELECTRIC MINING INSTALLATION.—110 H.-P. HOIST AT HEAD OF SLOPE.

The hoist is placed at the head of a small slope extending East from the parting at the foot of the main slope. The gangway in which the pump is placed is from 20 to 25 feet high and rather narrow. The hoist is placed on a platform built over the gangway, and the operator stands on an auxiliary platform directly behind the hoist, where he is not troubled by the vibration of the hoist when running. The motor is of the General Electric Railway type, completely closed to protect the windings from dust and moisture. It is series wound for 500 volts, and is capable of developing 110 horse-power for the intermittent work it is called upon to perform. The motor and drum are mounted on the same bed plate, and are connected by double reduction gears. The drum is of the friction cone clutch type, manufactured by the Lidgerwood Manufacturing Company, and is provided with two band brakes lined with wood. The clutch and brakes are operated by three levers and quadrants, while the motor is operated by a rheostatic controller to the left of the levers. The controller is provided with a magnetic blow-out. The hoist drum is 48 inches in diameter and 36 inches face and holds about 1,400 feet of one-inch wire rope. Under full load the rope strain on the hoist, at an average speed of 500 feet per minute, is rated at 5,000 pounds. The hoist is operated under the single-rope system, the empty trips are lowered by gravity and overhaul the rope, while the loaded trips are hauled up out of levels situated at intervals along the slope. The lowest level is about 1,200 feet from the hoist. The slope pitches on an average about 50 with a maximum of 80 at the approach to the knuckle, above which the empty and loaded trips pass on a parting directly under the hoist. The usual load up the slope is four loaded cars per trip at an average speed of 500 feet per minute. Each car weighs about three and a half tons, loaded, and in case of necessity the hoist is capable of hauling six cars per trip.

The installation of this plant was effected by the General Electric Company, and since it was started has operated continuously with satisfactory results.

The International Correspondence School, of Scranton, Pa., has undertaken a new departure. A handsome car for the schools, bearing a conspicuous sign, has been purchased and it will be sent on a tour through the principal manufacturing cities of the country. The president of the school, Mr. R. J. Foster, will be in charge of the car, and his assistant, Mr. John G. Forsythe, will be at the head of a corps of six assistants. The plan of work will be to locate the car for a time in the vicinity of large manufacturing establishments and afford to those interested a practical demonstration of the methods by which the work of the school is carried on. The car is a very beautiful one, fitted up with a reception room and compartments for the convenience of the entire party.

Increase in Storage Battery Business.

Sipe & Sigler, Cleveland, Ohio, manufacturers of the Willard storage battery, were awarded the contract for 900 cells for the city of Chicago, to be used in connection with their various fire-alarm circuits. This contract was awarded after a competitive test with all prominent makes of storage batteries.

They have delivered 58 cells to the Washburn Memorial Orphan Asylum, Minneapolis, Minn.; 64 cells to the Eclipse Electrical Company, St. Louis, Mo.; 80 cells to the American Incandescent Lamp Company, Warren, Ohio; 50 cells to M. A. Seed, St. Louis, Mo.; 28 cells to Prof. C. H. Wing, Ledger, N. C., and 38 cells to the Riker Electric Motor Company, Brooklyn, N.Y. These batteries are to be used in connection with isolated plants.

For telegraph and telephone purposes 100 cells were sold to the Home Telephone Company, Cleveland, Ohio; 40 cells to the American District Telegraph Company, Cleveland, Ohio, and several small orders to the Western Union Telegraph Company.

The horseless-carriage trade is very brisk, and they have received within the past two weeks orders for 700 horseless-carriage cells, among the purchasers being the Riker Electric Motor Company, Brooklyn, N. Y.; the United States Carriage Company, Chicago, Ill.; the C. H. Barrows Company, New York; Montgomery, Ward & Company, Chicago, Ill., and the Gugler Electric Company, Minneapolis, Minn.

An Unusual Projectile.

A press dispatch from New Brunswick, N. J., states that one day last week there was an explosion near the waterfront and a red-hot projectile 16 feet long and six inches in diameter went flying through the air from the yard of the New Brunswick Iron Works and landed in the yard of the Bell Hotel. The projectile was part of a pipe line intended to convey the Western Union Telegraph Company's wires under the Delaware & Raritan Canal. It had been filled with damp moulding sand and placed on end in the yard of the foundry and a fire built about it to heat it so that it might be bent. Although vents had been made in the pipe to let gases escape, these were not sufficient. Suddenly there was a terrific explosion and the foundrymen saw the 16-foot pipe shoot in the air like a skyrocket. Seventy-five feet across Water street it struck the high board fence of the hotel yard, tore a hole through it, then planted itself in an ash heap 15 feet further away.

Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED MARCH 1, 1898.

(Continued.)

599,940 Non-synchronous electric motor; B. G. Lamme, Pittsburgh, Pa.

599,941 Direct current electrical machine; B. G. Lamme, Pittsburgh, Pa.—In a direct current generator or motor, a field magnet having inwardly projecting pole pieces provided with relatively narrow magnetic pole shoes which project laterally from the pole faces and serve to increase the width of the fringe of the magnetic field.

599,942 Inductor dynamo; B. G. Lamme—A magnetizing coil provided with a magnetic circuit having a relatively wide air gap and a relatively narrow air gap in combination with a set of generating coils adjacent to said wide air gap.

599,943 System of electrical distribution; B. G. Lamme—A main direct current generator, a work circuit supplied thereby, and an auxiliary generator acting as a booster of electromotive force, an exciter for said auxiliary generator having its field magnet coils connected in series in the feeder or work circuit.

599,947 Electrically propelled vehicle; P. R. Salberg, Pittsburgh, Pa.—An electrically propelled vehicle provided with an overhead trolley, means for simultaneously applying the brakes and pulling down the trolley when the latter leaves the supply conductor, said means being controlled by the upward movement of the trolley above the conductor.

599,954 Switch for electric circuits; G. Wright, Wilkinsburg, Pa.—A double throw switch comprising stationary socket terminals, co-operating plungers and a pivoted operating lever having arms provided with cams for engaging and actuating said plungers alternately in opposite directions.

599,975 Portable electric lamp; L. Paget, New York, N. Y.—Consists of a case of two parts insulated from each other and lined with insulation, and a battery within the case, one terminal connected with one part and the other with the other part, and a lamp outside the case, one terminal connected with one part and the other with the other part of the case.

600,051 Centrifugal resistance controlling device; G. H. Whittingham, Baltimore, Md.—The combination of a revoluble head, a resistance mounted on the head, a switch arm engaging the resistance, and a centrifugally-operated lever mounted on the revoluble head and connected with the switch arm, whereby centrifugal force is utilized to gradually reduce the resistance when the current is turned on.

600,057 Rheostat and electric heater; H. P. Ball, Brooklyn, N. Y.—Consists of a ribbon-like conductor, a supporting body and a layer of adhesive material by which the conductor is attached to the support, and in which the conductor is only partially imbedded.

600,058 Flexible electric conductor; A. Bournonville, Philadelphia, Pa.—A flexible electric-conducting cord, having a single central section and two or more terminal sections at one end, a fabric covering for said cord extending continuously over the single section and the terminal sections.

600,073 Telegraph cable; J. J. Hall, Slough, England.

600,088 Current collector for dynamo-electric machines; G. W. Nell, Philadelphia, Pa.

600,092 Electrically-operated hoisting machinery; A. J. Shaw, Muskegon, Mich.

600,101 Supply system for electric railways; D. Urquhart, London, England.

600,112 Electric switch; J. J. Flint, Denver, Colo.

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600,134 Electric locomotive; H. Bitner; Chicago, Ill.

600,135 Electrical surgical instrument; A. W. Browne, Prince's Bay, N. Y.—An electrical surgical engine, consisting of the flanged base, the motor on the top of the base, the rheostat supported on the underside of the base, the socket of said base, and the upright standard detachably fitted in said socket.

600,228 Polyphase-current transformer; C. Kurda, Nuremberg, Germany - Consists of two or more sets of inducing coils of different phase placed one upon another, in combination with laminated sheet-inductive material surrounding said sets of inducing coils and separating them from each other.

600,252 Means for arresting motion of electric cars; W. C. Anderson, West Hoboken, N. J.—A local circuit including the motor or motors and the reversing switch or switches, two car controllers, two circuit closers or switches, one operated by each controller, the contacts on the controller and on the switches being so arranged that when the main source of current is cut off from the motors the switches are closed, completing the local circuit.

600,265 Electrical measuring instrument; A. H. Hoyt, Penacook, N. H.—An instrument having a graduated scale and a pointer whose movement thereon is caused by the current on the circuit, suitable mechanism for preventing a return movement of said pointer to zero, should the current be diminished or stopped after having recorded the maximum load on the circuit.

600,277 Electric arc lamp; J. H. Duncan, San Francisco, Cal.

600,285 Electric heater; R. J. Holland, New York, N. Y.—A flexible, liquid holding receptacle provided with a contracted mouth or aperture, an insulating closure consisting of a screw-plug having a connected housing, one or more resistance coils within said receptacle and attached to said screw-plug, electrical connections to said coil or coils within said housing, and a switch also within said housing and by means of which the electric current may be turned on and off as desired.

600,290 Therapeutic electrode; J. S. Muir, San Francisco, Cal.—Consists of an electro-chemical decomposing cell of porous material adapted to contain an electrolytic fluid, and electro-conducting-rod extending thereinto, and means whereby a current may be passed through the electrolyte within the porous cell.

600,336 Insulating connector; H. E. Pearce, Brooklyn, N. Y.—An insulating connector for electrical fixtures, having a top bracket formed with a hub, whose opening is larger than the diameter of the supporting pipe or rod and set screws in the said hub for attaching the said connector.

600,356 Automatic regulator for electric currents; J. D. C. Chateau, Paris, France.

600,380 Galvanic apparatus; G. H. A. Schaeffer, Buffalo, N. Y.

600,381 Electric railway; L. Scherpe, St. Louis, Mo.

600,383 Electrically operated brush; A. Sherwood, Topeka, Kas.

600,417 Electric heater; E. E. Gold, New York, N. Y.—An electric heater comprising a helix of resistant wire coiled into a compound helix, combined with a support therefor, said helix being compressed against said support so that it exerts an expansive tendency.

600,457 Electrical battery; N. B. Stubblefield, Murray, Ky.

The Badt Hermetic Cell.

All who have the care and handling of primary batteries know the annoyance caused by the evaporation of the liquid and the creeping of the salts. Generally the failure of the door-bell to ring, or of the gas lighting to ignite, is the first intimation the user has that something is wrong.

This creeping of salts is usually started by the evaporation of the liquid. As the liquid becomes more and more concentrated salts must form, for a certain amount of water can hold only a certain quantity of salt in solution.

FIGS 1, 2 AND 3.—THE BADT HERMETIC CELL.

If there is no creeping of salt, of course there will be no danger from short circuiting of the electrodes within the cell.

The Badt hermetic cell, illustrated herewith, is claimed to entirely overcome all difficulties met with in the use of primary, open-circuit batteries. Fig. 1 shows the glass jar, with a part broken away, disclosing a channel or trough, which in practice is filled with oil and in which the inner flange of the cover, Fig. 2, fits. The outer rim of the cover surrounds the top of the jar, preventing dust from getting into the oil trough. Each electrode (zinc and carbon) has a shoulder carrying a metal terminal passing through a hole in the cover, and by means of soft rubber washers these openings are made airtight. The electrodes shown in Fig. 3 consist of zinc and carbon only, the latter having no chemical depolarizer. To prevent polarization a large carbon surface of peculir cross-section is provided. Full directions for setting up accompany each cell and from the excellent design of the battery it is safe to predict that it will meet with a large sale.

TELEPHONE NEWS AND COMMENT.

The telephone service for residences at Jellico, Tenn., has been reduced from $2 to $1.50 per month.

The Mississippi Valley Telephone Company, of Minneapolis, Minn., has been incorporated with a capital stock of $1,000,000.

Joseph Henn, of Allentown, Pa., has brought suit against the Pennsylvania Telephone Company to recover $15,000 for personal injuries received in a dynamite explosion at New Holland a year ago, as a cause of which, he claims, he was made permanently deaf and sustained a serious affection of the brain.

ELECTRIC LIGHT FLASHES.

The city of Grand Rapids, Mich., which some time ago voted bonds for a municipal lighting plant, has finally decided to build the same. It will have a capacity of 500 arcs and 1,000 incandescents. Steam will be used. Messrs. Nagle & Ball, Chicago, are the engineers.

The Union Light and Power Company, which has succeeded to all the rights of the Salt Lake & Ogden, Utah, Gas and Electric Light Company, is furnishing manufactured gas to all consumers at 50 cents per 1,000 cubic feet, which is said to be less than the actual cost of production.

The Receivership of the Warren Electric Company.

Mr. C. C. Warren, of Sandusky, Ohio, writes to the ELECTRICAL REVIEW that the request for the appointment of a receiver for the Warren Electric Company, of Chicago, Ill., has "no possible connection with the Warren Electric Manufacturing Company, of Sandusky, Ohio." Mr. Warren further states that the action was applied for by himself and was for the purpose of adjusting certain claims against the Illinois company.

Brooklyn Motormen To Get Increased Pay.

President Rossiter, of the Brooklyn Heights Railroad Company, of Brooklyn, N. Y., announced last week that it was the purpose of the company to shortly increase the salaries of the faithful motormen and conductors who have been in its service for three years or upward. The men are at present getting 20 cents an hour.

ADVANCE INFORMATION

Electric Light and Power.

SAN FRANCISCO, CAL. — The Jamestown Electric Light and Power Company has been organized by William A. Neville, John Ballard, W. H. Martin, W. Grant and R. B. Carpenter; capital stock, $500,000.

IRONTON, OHIO—George H. Davies, City Clerk, may be addressed concerning lighting of streets with electricity.

WILKESBARRE, PA.—Harvey Lake Electric Light, Heat and Power Company has been incorporated; capital, $1,000.

PHILADELPHIA, PA. — Nescopeck Electric Light Company, of Luzerne County, has been incorporated; capital, $5,000.

MOUNT OLIVE, N. C. — J. D. Williams is reported interested in the proposed electric light plant.

MILWAUKEE, WIS.—The South Milwaukee Electric Light Company has been incorporated. The capital stock is $15,000. The incorporators are William P. Cook, F. S. Pamperin and William Wiotte.

PORT JERVIS, N. Y.—Port Jervis Light and Power Company has been incorporated, with a capital of $50,000; directors, William P. Richardson, C. J. Field, George A. Elston and C. J. Van Inwegen.

LEBANON, PA.—Mayor Weimer has vetoed the ordinance appropriating $12,000 for the reconstruction and improvement of the city arc light system.

TOOELE, UTAH—The citizens of this place are discussing a proposition to bond the town for $10,000 in order to get an electric light plant started. The matter, it is believed, will go through.

LONG CREEK, ORE.—A movement is on foot here to organize a company for the purpose of putting in a plant and supplying the city with electric lights. Local capitalists are interested in the matter.

WARWICK VALLEY, N. Y.—Warwick Valley Light and Power Company, to operate in the towns of Warwick and Chester, Orange County, with a capital of $25,000, has been incorporated. Directors, George Whitman, of Morris, Otsego County, and Frank Barber and Helen Barber, of Liberty, Sullivan County.

WISE, VA.—John E. Hale is interested in the proposed erection of electric light plant.

SHELL LAKE, WIS.—City Clerk may be addressed concerning electric power and light plant. The business men are considering a proposition from the D. & D. Electric Manufacturing Company, of Minneapolis.

DODGEVILLE, WIS.—The council has granted a 10-year electric light franchise to W. H. Earl, of Chicago.

BAMBERG, S. C.—The Mayor may be addressed concerning electric light plant.

New Electric Railways.

HAGERSTOWN, MD.—The Hagerstown Street Railway Company is in charge of the electric light and power plant.

BRIDGETON, N. J.—The Bridgeton & Millville Traction Company has been granted a franchise for an extension of its trolley line down South avenue to Fairton, a distance of four miles.

NEWPORT NEWS, VA.—The Chesapeake & Hampton Roads Railroad Company has secured a charter to construct an electric railway.

XENIA, OHIO—Steps are being taken to build an electric railway between this city and Dayton by way of Alpha.

SOUTHINGTON, CT.—The Meriden, Southington & Compounce Tramway Company has been granted a franchise to extend its line through this place.

RALEIGH, N. C.—All available stock has been subscribed to for the construction of a new electric railway line.

TIFFIN, OHIO—The Tiffin, Fostoria & Eastern Electric Railway has been incorporated and is to run from this place to Fostoria with power to extend to other municipalities; capital stock, $175,000. The incorporators are D. H. Kimberly, Charles O. Evarts, C. W. Gabriel, B. G. Tremaine and F. N. Wilcox.

TRENTON, N. J.—The Ewing Passenger Railway Company has been incorporated, with a capital stock of $12,500. The company will build a road through the township of Ewing to Prospect street as a branch of the Trenton Passenger Railroad Company, Consolidated. The incorporators are Henry C. Moore, president of the consolidated company; Robert S. Woodruff, Judge of Mercer County; B. Frank Abbett, Peter E. Hurley, J. H. Solomon, W. S. Gulick and F. P. Nippes, of Trenton.

MINNEAPOLIS, MINN.—The Minneapolis & Anoka Electric Suburban Railway has been incorporated, with a capital stock of $100,000. The incorporators are Henry Lee, I. A. Caswell, A. E. Gidings, Thomas and John Coleman, John Dunn, Hiram Thornton, O. L. Cutter and Frank Hart, all of Anoka.

CUMBERLAND, MD.—Judge Sloan has granted certificates of incorporation for the construction of an electric railway from Cumberland to Westernport, through the mining region, 30 miles.

New Telephone and Telegraph Companies.

ENFIELD, ME.—The Enfield Telephone Company has been organized with the following officers: Samuel W. Bragg, president; Michael S. Fahey, treasurer; Herbert W. Lord, clerk; Herbert O. Averill, Charles G. Jewell, Fred S. Lord, Samuel W. Bragg, Orrick H. Wakefield, directors; the capital stock is $2,000.

PAWNEE CITY, NEB. — A local company has been organized for the purpose of building and maintaining a telephone system in this city, with the object of extending to the different towns throughout the county. Stock to the amount of $3,500 has been already subscribed and arrangements are being made to push the work to speedy completion.

GRIFFIN, GA.—E. W. COLEMAN is interested in the proposed telephone system.

DAWSON, GA.—B. D. Menser is interested in the movement for telephone line extensions.

BUCYRUS, OHIO — The Bucyrus Telephone Company has been incorporated for the purpose of building and operating a telephone line in Crawford and adjoining counties. The incorporators are James S. Bailey, Jr., Chas. D. Juinivall, Ed L. Barber, M. A. Charlton, S. R. Harris, J. L. Assenheimer, H. E. Valentine.

ATHENS, ALA.—The Athens Telephone Company is preparing to enlarge and increase its system, and make general improvements, etc.

GAINESVILLE, GA.—Col. H. P. Farrow has applied for county permission to establish his proposed telephone system.

SPARTA, TENN.—The Gainesboro Telephone Company line will be extended from this place to McMinnville immediately.

HERNDON, VA.—A telephone line is to be constructed to connect this place with Falls Church and Fairfax Court House. Posts for the telephone line have been distributed, and the line will shortly be in operation.

LITCHFIELD, MINN. — The local telephone company here is actively preparing to build new lines to connect with all towns and villages around this place, as soon as the Spring opens. From 50 to 75 miles of line will be put in, all connecting with this city.

CHARLESTON, W. VA.—The Wilson Spring and Telephone Company has been incorporated by Jos. T. Stubbe, Vernon M. Pierce, Prentice H. Manning, Josiah Hinckley and George G. Hackett; capital stock, $100,000.

WINCHESTER, TENN.—S. M. Alexander is interested in the establishment of a telephone system.

DETROIT, MICH.—The New State Telephone Company has petitioned for permit to operate a telephone system in this city.

NEBO, KY.—Dr. Ferguson is arranging for the extension of telephone line from Nebo to Silent Run.

BRISTOL, TENN.—The telephone system at this place is to be extended.

MARSHFIELD, WIS. — The City Council has granted a franchise to R. L. Kraus and K. W. Doege for the establishment of a telephone system here.

PUEBLO, COLO. — The Colorado Telephone Company is about to erect a $10,000 building at Pueblo, and will complete its line from Pueblo to La Junta this year.

CUMBERLAND, MD. — The Maryland, Pennsylvania & West Virginia Telephone Company has obtained franchise for telephone system, etc.

CAPE GIRARDEAU, MO.—The Jackson Telephone Company has been incorporated by Samuel Hitt and others; capital stock, $2,500.

WINCHESTER, TENN.—S. M. Alexander, M. N. Whitaker and George E. Banks are endeavoring to form a company to establish a telephone system.

New Incorporations.

PIERRE, S. D.—Articles of incorporation have been filed for the Robertson Pneumatic Electric Transmitting Company, at Aberdeen, with a capital of $5,000,000; incorporators, A. J. Robertson, C. T. Kerr, Chicago, and C. T. Easton, Aberdeen.

DETROIT, MICH. — The International Typal Telegraph Company has been incorporated; the capital stock is $10,000, and the incorporators are

William F. Jarvis, Thomas S. Jerome and William H. Flynn, of Detroit.

CHARLESTON, W. VA.—The Greenbriar Valley Construction Company has been granted articles of incorporation, for the purpose of constructing railroads, telegraph lines, etc.; capital stock, $2,000,000.

CHICAGO, ILL.—The Construction and Maintenance Company has been incorporated; capital stock, $25,000; incorporators, C. S. McCoy, E. D. Mohan and Charles W. Leffler.

CHICAGO, ILL. — The Columbia Traction and Express Company has been incorporated; capital stock, $50,000; incorporators, George A. Swartout, Frank L. Moulton, H. A. Schriver.

BINGHAMTON, N. Y.—The Binghamton Electrical Construction Company has been incorporated; capital, $5,000; directors, Charles F. Terhune, L. M. Blanding and R. E. Prince.

CHICAGO, ILL. — The Crofton Storage Battery Company has been incorporated; capital stock, $25,000; incorporators, Charles B. Stafford, A. C. Crofton and J. K. Pumpelly.

JERSEY CITY, N. J.—The Electrical Engineer Institute of Correspondence Instruction has been incorporated; capital, $50,000; incorporators, Herman A. Strauss, Joseph Wetzler and Thomas C. Martin, New York, and Edward Ruth, town of Union, N. J.

Increase of Capital.

CLEVELAND, OHIO—The Cleveland & Newcastle Railway Company has increased its capital stock from $10,000 to $3,000,000.

BRISTOL, PA.—The Langhorne & Bristol Trolley Company has increased its capital stock from $100,000 to $200,000, in order to extend its road several miles this Summer.

CRESTLINE, OHIO—The Crestline Telephone Company has increased its capital stock from $6,000 to $10,000.

Business Troubles.

CHARLESTON, S. C.—The Carolina Mutual Telephone and Telegraph Company has gone into the hands of a receiver.

NEW YORK, N. Y.—The Standard Incandescent Company, manufacturers of incandescent gas lamps and fixtures, 147 Center street, has made an assignment. The liabilities are only $1,500, and the nominal assets $6,000.

MICHIGAN CITY, MO.—J. I. Spiro has been appointed receiver of the Lake Cities Electric Railroad Company.

MEDINA, N. Y.—The Medina gas and electric light plants are now in the hands of a receiver.

LEXINGTON, KY. — Mr. Noah Franklin has been appointed receiver of the Lexington electric light plant.

The Telegraph Service of Mexico.

Under date of Nuevo Laredo, Mexico, February 10, 1898, United States Consul-General Donnelly says:

"An interesting phase of government ownership of public utilities is being presented in Mexico, where the government operates a telegraph line of its own in competition with the lines of the several railroads. Advocates of government ownership would doubtless expect the government service to be the cheapest and best. Such, however, is not the case. The railroads give the promptest service and generally at lower rates. The following table shows the government and railroad telegraph rates on 10 words from Nuevo Laredo to the cities named:

Nuevo Laredo to	Government rate.	Railroad rate.
Monterey	$0.40	$0.26
Saltillo	.60	.51
San Luis Potosi	1.30	1.16
Mexico city	1.60	1.61

"As a natural consequence, the railroads have done the great bulk of telegraph business, both foreign and domestic."

Consul-General Donnelly, however, states that by a recent arrangement entered into by the government with the Western Union Telegraph Company, of the United States, the latter company cedes to the government the sole right to that company's Mexican business, and the Western Union, in return, obtains the business of the federal telegraph line. The government has also issued an order prohibiting the railroads from handling any international messages. The effect of this will probably be to deprive the railroads of considerable business, and to give the Western Union company control of the international telegraph service.

Mrs. Susan St. John, of New York, has just won her suit of $10,000 against the North Chicago Street Railway Company, for injuries received from a fall from a car in 1895.

The Long Island Railroad has bought the Huntington, L. I., street railway. Electric power will be adopted.

Kindred.... ...Interests

The Shawmut Fuse Wire Company, Boston, are makers of the new Cartwright enclosed airtight fuse.

A new plant for the production of electric light carbons has just been established at North Tonawanda, N. Y., by the Niagara Carbon Company.

The Berlin Iron Bridge Company, of East Berlin, Ct., are building a new boiler-house roof for the Coe Brass Manufacturing Company, at Ansonia, Ct.

The plant of Sessions Foundry Company, at Bristol, Ct., is now operating a number of cupolas carrying varying mixtures of metal which are specially adapted for castings for electrical machinery. This company also makes the "Compo" brake shoes.

Mr. W. O. Knudsen, 914 New England Building, Cleveland, Ohio, has opened a branch office for the Electric Storage Battery Company at the address given, for the more convenient handling of the company's business in the territory adjacent to Cleveland.

The Walker Company states that the type "S" solenoid blow-out controller is the most popular one the company has ever placed on the market. The controller departments of their factories are turning out very large numbers of the type "S" apparatus.

The new store, established by the Crouse-Hinds Electric Company, at 22 Dey street, New York, has an interesting line of the company's switches, panels, switchboards and electrical specialties, made in their Syracuse shops. Mr. F. M. Hawkins has charge of the New York interests.

A new catalogue of the "roll-drop" commutator bars for generators and motors, made by the Forest City Electric Company, of Cleveland, Ohio, has just been issued. Space in the booklet is also given to a description and illustration of the "protected" rail bars made by this company.

Secretary Elmer W. Gillmer, of the Warren Electric and Specialty Company, of Warren, Ohio, asks the editor of the ELECTRICAL REVIEW to announce that an Ohio company of a similar name, which recently asked for a receivership, had no connection with the Warren Electric and Specialty Company.

The Hunter Fan and Motor Company, of Fulton, N. Y., have the '98 styles of alternating current ceiling fans in readiness. The eastern sales management for the company is in charge of E. B. Latham & Company, 136 Liberty street, New York, and the western in charge of the Western Electric Company, Chicago.

In advertising the Vistor split insulator and swinging tree insulator, the Western Electric Company has issued a neat little circular, the cover of which states "When the wind blows protect your lines." It is certainly good advice, as there is nothing more aggravating to the central station manager than to have the lines break down and cut off the supply of current to the customers.

The Bristol & Plainville Tramway Company are erecting near Plainville, Ct., a new substantial steel bridge, having a span of about 90 feet. The bridge has been designed with a view of being a permanent structure, well able to take care of the increasing and heavy traffic of the road. It has been furnished and is now being erected by the Berlin Iron Bridge Company, of East Berlin, Ct.

The Walker Company's Agency, Wybro & Lawrence Company, Los Angeles, Cal., report the sale of a 500-kilowatt eight-pole 300-revolution-per-minute special-belted generator to the Los Angeles Traction Company, where it will be installed between two General Electric 250-kilowatt machines. This is the second large generator sold by them in this city, the other being of 800-kilowatt capacity direct-connected.

The Cincinnati Street Railway Company has closed a contract with the General Electric Company amounting, it is said, to over $100,000. It covers the necessary electrical apparatus to enable the Cincinnati company to change over that portion of its system now driven by cable, the Walnut Hills line, to an electric system. The Boston Elevated Railway has also placed a contract with the same company for electrical apparatus amounting to the same sum.

The K. & W. Company — The stockholders of the K. & W. Company, the manufacturers of the Hardy incandescent lamp, have recently voted a $10,000 increase in their capital stock. The flattering reception which the Hardy incandescent lamp received at the hands of the trade and the increased hanger board, brush and commutator compound business has required additional apparatus, and hence the increase of capital.

The steel spring wires made by Hammacher, Schlemmer & Company, 209 Broadway, New York, are pro-

duced especially with the purpose of reaching the greatest tensile strength and absolute uniformity. These are the essential features for reliable springs for electrical apparatus.

The electrical compounds, armatures and field coil varnish, ruberoid motor cloth and insulating tape manufactured by the Standard Paint Company, New York, are standard the world over.

The increased sales of the commutator bars of the Mansfield Copper Company have made it necessary for them to triple the capacity of their brass foundry, by placing an addition of 50 by 100 feet to it.

The "Cross" oil filters are now in use in hundreds of the best equipped electric power stations in this country and Europe. This oil filter, made by the Burt Manufacturing Company, Akron, Ohio, if used for a year reduces the oil consumption 50 per cent. The equipment is made with daily capacities varying from three to 120 gallons.

The Western Electric Non-Sparking Brush has proven to be one of the best preventives of the disastrous sparking which so frequently interferes in the successful operation of a dynamo. They are now being used in almost every city in the United States. A circular giving regular stock sizes and price lists of these brushes will be mailed by the Western Electric Company to any one desiring information in regard to them.

The Electric Appliance Company wish to emphasize the fact that they are agents for a commercially successful electric soldering iron. They have now been handling the irons of the American Electrical Heater Company for about two years, and state that in not a single case have they been unable to secure satisfactory results. They are willing to show their confidence in these goods by guaranteeing every iron they send out to do its work in an entirely satisfactory manner.

An armored submarine cable, 9,000 feet long, was lately laid across the Ohio at Cairo, Ill., for the Cairo Telephone Company. The cable was manufactured by the Indiana Rubber and Insulated Wire Co., of Jonesboro, Ind., and was two and one-half inches in diameter, containing three pair of conductors. Each conductor was made of three strands of 18 B. & S. copper wire. This is the second cable furnished by the Indiana Rubber Company to the Cairo Telephone Company.

The Davis & Egan Machine Tool Company, of Cincinnati, Ohio, have just received an order through their Amsterdam office for several lathes, shapers and heavy screw machines, to be used by the Holland Government. They also received through their London office, orders for lathes, drill presses, planers and shapers for Greenwood & Bailey, machine tool builders and government contractors at Leeds. Business in this country is also improving, the company having secured a number of large orders here in the past week.

Steel gears and pinions form the subject of a small pamphlet, well illustrated and printed, issued from the press of the General Electric Company, under the title "A Modern Gear Plant." It contains a description of the extensive plant which that company has established at the River Works at Lynn, for the exclusive manufacture of steel gears and pinions, equipping it throughout with the most modern machinery. This pamphlet will be sent on application to any of the company's sales offices, one of which is found in every large city in the United States.

The Hoppes Manufacturing Company, of Springfield, Ohio, makers of the well known feeders and purifiers, have recently received the following orders: Three 1,500-horse-power feeders and three 1,000-horse-power purifiers from the United Traction Company, Philadelphia, Pa. The New York Sugar Refining Company have ordered three 1,250-horse-power purifiers and three 1,500-horse-power heaters. Two 1,250-horse-power purifiers to the Duting Harvesting Company, of Chicago, Ill., and one 1,000-horse-power purifier to Proctor & Gamble, Cincinnati, Ohio.

The Card Electric Company, of Mansfield, Ohio, have added quite an extension to their offices and are also making large extensions to their present shop and foundry. When these improvements have been completed the company will be in a position to handle orders with considerable grace and promptness, and it will also facilitate matters materially as to the building of the large and heavier machines. These extensions are due to the fact that they anticipate a greater output during this and the coming year. The Card company has also issued under recent date a very neat and handsome catalogue with illustrations and descriptive matter of their new designs in direct current, slow speed, multipolar dynamos and motors, both for belted and direct service, and will be pleased to supply copies of these on application.

A very durable conduit made of vitrified clay is being manufactured by H. B. Camp & Company, of Aultman, Ohio. The conduit is made in duct from eighteen inches long and from two to three inches in diameter, which enables it to be conveniently handled and quickly laid. A bedding of concrete is not necessary in the use of this conduit except as a protection against injury by future excavations, as the extreme hardness of the glazed clay renders it injurious to all actions of acids, gases and the like. On account of the slow and uneven burning of the inner walls of the conduits it was found impossible to attain a correct alignment of the multiple ducts, and to avoid this the single duct was introduced, by which means a smooth and even jointure could be made thereby allowing the cable to be passed through it without any danger from sharp projections. By the amalgamation of silica and other sandy elements in the burning of the clay a hardness almost approaching glass, though much more elastic, is obtained making it almost indestructible when protected by cement. The company is also manufacturing a clay conduit for use in the underground pneumatic tube system now rapidly coming into use throughout the country, the inner lining of which is made perfectly smooth with rounded ends, which when joined form an air-tight covering and afford protection from the action of gases on the copper tubing. H. B. Camp & Company reported the following large orders lately received by them: The Metropolitan Street Railway Company, New York city; the Edison Illuminating Company of Boston, Mass., and the Boston Elevated Railroad Company.

The Cabinet Manufacturing Company, of Steubenville, Ohio, write us as follows: "You can state that we are progressing nicely with our new works, and have booked a number of new orders, and receive by every mail a large number of inquiries for new work. The prospects are rosy. We appreciate the good work the REVIEW does."

The Diesel Motor.

Mr. H. D. Dupee, secretary of the Massachusetts Charitable Mechanic Association, of Boston, informs the ELECTRICAL REVIEW that the Diesel motor will be exhibited for the first time in New England at the Mechanics' Fair in Boston next October.

Partnership Dissolved.

Notice is hereby given that the partnership between R. Barclay Twining and Stephen D. Large has this day been dissolved by mutual consent.

R. B. Twining is authorized to settle all debts due to and by the firm of Large and Twining. The business will be continued at 321 Chestnut Street by Stephen D. Large, under the firm name of Stephen D. Large & Co., Phila.

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The Universally adopted NATIONAL ELECTRICAL CODE, Explained and Illustrated in this year's edition of the Hand-Book.

"Standard Wiring"
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"This work is an authority on electric light and power wiring from the Fire Underwriters' standpoint, and is kept strictly up to date.—*Electrical Review.*

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LITERARY.

A new publication called *The Universe* has appeared and is published at 96 Fifth avenue, New York. It is neatly gotten up in book-form, is illustrated, and is devoted to the work of interesting young people in a non-sensational and instructive manner. The publisher is Mr. E. J. Wessels, formerly general manager of the Standard Air Brake Company, and Mr. T. C. Martin conducts the department entitled "Easy Science."

How a workingman can "feed" in Chicago at from 5 to 15 cents per meal is told by Mr. Wyckoff in the April chapter of "The Workers" in *Scribner*. He reveals one of the day-laborer's greatest consolations, when he says: "When living is a daily struggle with the problems of what you shall eat and what you shall drink, and wherewithal you shall be clothed, you take no anxious thought for the morrow, quite content to let the morrow take thought for the things of itself, for sufficient unto the day is the evil thereof."

"MODEL ENGINES AND SMALL BOATS. NEW METHODS OF ENGINE AND BOILER MAKING. WITH A CHAPTER ON ELEMENTARY SHIP DESIGN AND CONSTRUCTION." By Nevil Monroe Hopkins. Cloth, 74 pp., 50 illustrations; price, $1.25. Sent post free on receipt of price by Electrical Review Publishing Company, Times Building, New York.

An interesting and instructive handbook for amateurs. A system is described of constructing small steam engine cylinders without patterns, and castings and boilers without the use of special tools.

The Baldwin Locomotive Works, of Philadelphia, has presented the department of mechanical engineering of Columbia University with the locomotive exhibited at the World's Fair, valued at about $12,000. Within the past few months donations of machinery to this department have been made, valued at $60,000.

General Greely on the Need of a Military Signal System.

General Greely, the Chief Signal Officer of the army, has written the following letter to the Secretary of War, who has forwarded it to Chairman Cannon, of the House Committee on Appropriations:

TO THE HONORABLE THE SECRETARY OF WAR.

Sir: The estimate of $20,000 for cables to connect electrically the fortifications in the harbors of New York, Boston and Philadelphia, has been omitted in the Sundry Civil bill as reported by the House of Representatives. The Chief Signal Officer would be derelict in his duty did he not call the attention of the Honorable the Secretary of War to the necessity of urging upon the Senate such an appropriation. For seven consecutive years the Chief Signal Officer has unavailingly recommended the importance of this matter, reciting the fact that some of our most important defences can only be reached by messenger.

The destruction of the military cables between Alcatriz, Angel Islands, and the mainland, long since left the fortifications in San Francisco harbor isolated and entirely unconnected, electrically, and Fort Warren, in Boston harbor, is also without reach by telephone or telegraph. In New York harbor, it is true that several posts can communicate with each other over circuitous commercial routes, but such complicated methods, inadequate in peace even, would inevitably break down in case of actual hostilities.

These estimates have been recommended both by you and by former Secretaries of War, have been repeatedly urged as military necessities by the commanding generals of the departments affected, and have been heartily approved by the commanding generals of the army.

Never more than to-day have time and co-operation been more potent elements of strength, whether in the industries of peace or the art of war. In the business world the most acute minds of the century are applying themselves to the development of speedy and increased communication, especially through electrical devices, and the failure of any country to utilize in this direction the highest inventive skill must materially lessen its chance of success in war. In every other country of the world the entire system of harbor defence for each port is connected electrically, so that not only are intercommunication and the transmission of orders constantly maintained, but the fire control and the direction of the defence rest under one master mind. It must seem hardly credible either to business men or to experts that Congress, after authorizing a system of coast defences to cost millions of dollars, should for years refuse to connect the military forts around the great cities of New York, Boston and San Francisco, either electrically or telephonically. In critical emergencies, such as arise in all defences, military operations at those points would, under existing conditions, be necessarily conducted without concert or unison, thus needlessly jeopardizing lives by the thousands and property to the value of hundreds of millions of dollars.

The present situation is parallel to that which would exist if our great cities, after spending tens of thousands of dollars in thoroughly establishing a fire department, should refuse to install therewith an electrical signal system or insist that alarms of fire should be sent either by messengers or by the nearest commercial telegraph line. Very respectfully,

A. W. GREELY,
Chief Signal Officer.

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LYONS & BISSING.

MR. JOSEPH LYONS, Electrical Expert and Solicitor, and *MR. GUSTAV BISSING, late Principal Examiner of Electrical Division A, U. S. Patent Office.* announce the formation of a partnership for the general practice of PATENT LAW, with its offices at the McGill Building, WASHINGTON, D. C.

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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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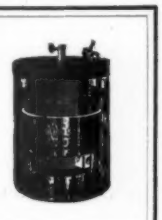
GORDON PRIMARY CELL



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INDUSTRIAL NOTES.

New Western Offices.

The constantly increasing business of Mr. M. B. Austin, western agent for the Safety Insulated Wire and Cable Company, of New York, and Holmes, Booth & Haydens, of Waterbury, Ct., has made it necessary for him to seek larger quarters, and on or about March 20 he will move both his offices and storeroom to No. 521 Dearborn street, where he will have greatly improved facilities for handling the business in his lines, which has grown so rapidly in the three and one-half years he has represented the above companies.

Mr. Austin claims to carry the most complete line of rubber-covered wires and cables west of New York city. His stock includes all styles of electric light wires and cables, also lead-incased cables, which have proven a great convenience to the western contractors. Telephone wire twisted in pairs for all telephone purposes has been a specialty with Mr. Austin, and his stock in this line is among the most complete in the United States.

In spite of the exacting demands upon his time by the regular business, Mr. Austin finds time to occasionally surprise the public with a specialty of some kind, his latest successful effort being the New York switch, illustrated some time ago in the ELECTRICAL REVIEW. This switch bids fair to be the coming switch where a flush switch is desired.

C. E. K.

The Davis & Egan Machine Tool Company.

The rapidly increasing business of the Davis & Egan Machine Tool Company, Cincinnati, Ohio, has forced them gradually to extend their plant to almost double its original size, besides occupying nearly two blocks on Sixth and Egglestone, Cincinnati. They are now building a factory in Covington, Ky.

The new shop is a handsome structure, 300 feet long by 100 wide, built half of brick and half frame, and equipped with all the latest improvements.

The factory is lighted throughout with electricity, furnished by the Triumph Electric Company of Cincinnati, Ohio, and equipped with electric traveling cranes made by the Morgan Engine Company.

Located on the C. & D. Railroad, a special track has been run through the building, thereby enabling the packing and shipping of heavy machinery to be done within the shop.

A force of 300 men will be employed, and the company will use the building for the manufacture of the heavier pieces of machinery, such as borings and turning mills, large planes and lathes.

The motive power for running the plant will be furnished by Stirling boilers and Corliss engines.

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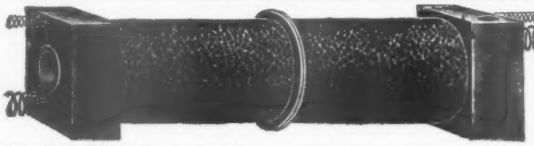

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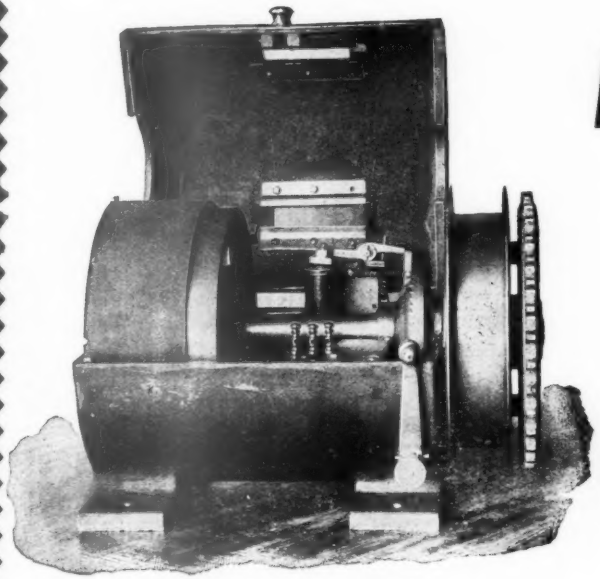

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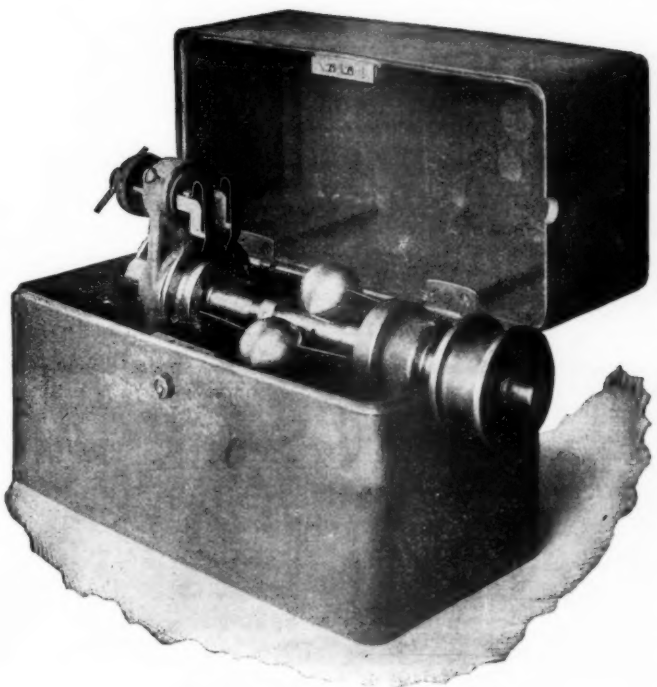

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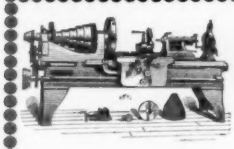

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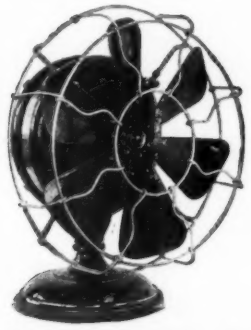

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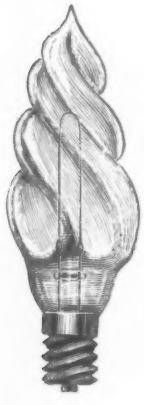

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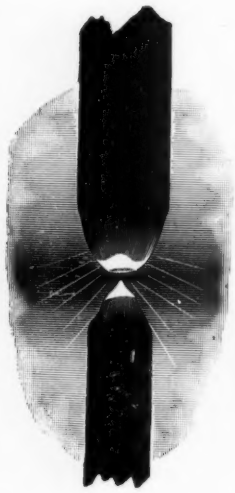

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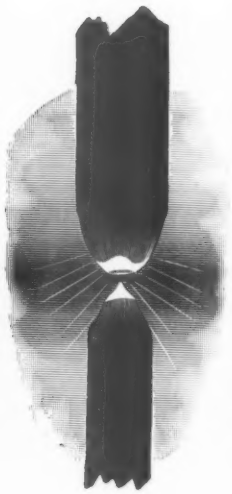

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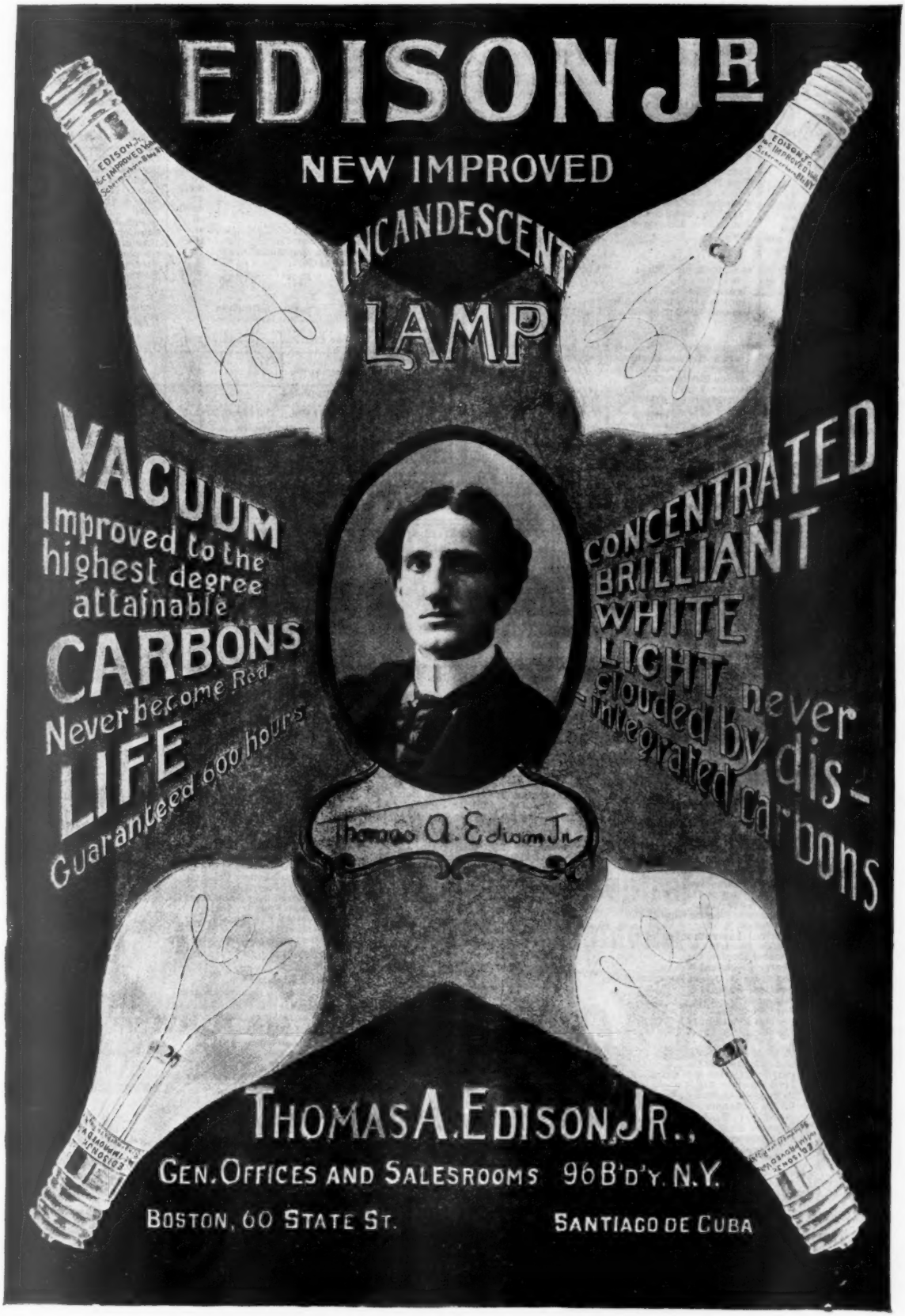

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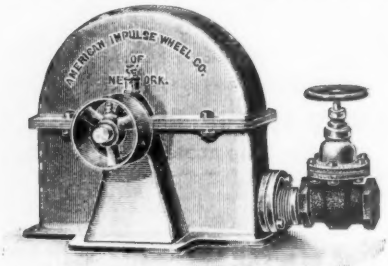

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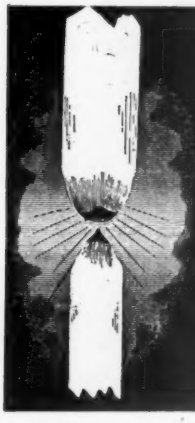

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